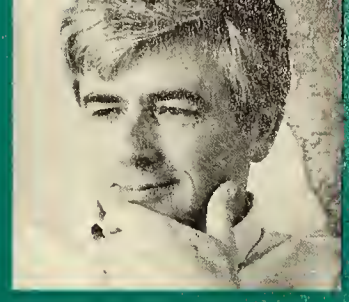
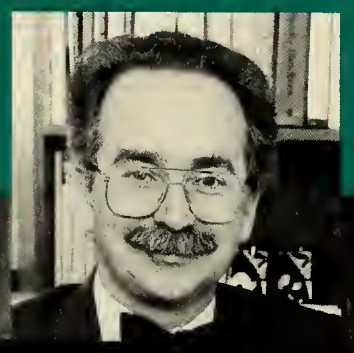


Harvard School of Public Health



Official Register of Harvard University 1992-1993

Volume 14, Number 9
September 5, 1992

Every effort is made to ensure the information contained in this Register is accurate at the time of publication. However, the School of Public Health reserves the right to make changes without notice in tuition and fees, admission and degree requirements, courses of instruction, and other information contained herein. These changes will govern all students, including students who matriculated prior to the changes coming into effect.

As a matter of policy, law, and commitment, the School of Public Health does not discriminate against any person on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or handicap in admission to, access to, treatment in, or employment in its programs and activities. The following person has been designated to handle inquiries regarding the nondiscrimination programs: Ann R. Oliver, Associate Dean for Academic Administration, 677 Huntington Avenue, Boston, MA 02115; telephone 617-432-1069. In addition, inquiries regarding the application of nondiscrimination policies regarding race, color, national origin, age, sex, or handicap may be referred to the Regional Director, Office for Civil Rights, U.S. Department of Education, J.W. McCormack POCH, Room 222, Post Office Square, Boston, MA 02109.

Chapter 151c, Section 2B, of the General Laws of Massachusetts
Any student in an educational or vocational training institution, other than a religious or denominational educational or vocational training institution, who is unable, because of his religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement, and shall be provided with an opportunity to make up such examination, study, or work requirement which he may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section.

The Harvard School of Public Health is accredited by the Council on Education for Public Health.

Photo Credits: Laurie Belisle, Steve Borack, Sarah Hood, M. Lutch Larry Maglott, Sue Owrutsky, Barbara Steiner

A Note From the Dean

Public health is concerned with preserving and enhancing the health of populations. The scope of public health is extensive, as reflected in the range of courses, departments, centers, programs, and facilities described in this Register. The interests and expertise of faculty at the school are similarly diverse, extending across biological sciences, social sciences, numeric disciplines, and more.

The Register contains a wealth of information about educational opportunities at the Harvard School of Public Health. Though we have endeavored to make it accurate and comprehensive, it is necessarily an incomplete description of the learning experience available at the school. The School of Public Health is a place to acquire new skills; a place to enrich one's professional perspective by interacting with fellow students as well as with faculty; a place to gain a more sophisticated understanding of health sciences, health issues, and problems and their possible solutions; a place to test one's ideals, objectives, and imagination against the imposing array of biological, individual, organizational, economic, and political barriers to improved public health.

The principal educational mission of the school is to prepare leaders in professional service and the sciences aimed at promoting the health of populations. We believe we are engaged in a vital enterprise of central importance to society. We welcome those who join us at the school to share in that sense of excitement and challenge.

Harvey V. Fineberg,
Dean

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Academic Calendar 1992-93

Advance Seminar-Fall 1992

Monday, September 7 through September 15

The Advance Seminar Program presents an opportunity for international students and new Master of Public Health (MPH) students to orient themselves to the Harvard School of Public Health and to Boston. It provides a brief, intensive introduction to the academic aspects of study at the school, including beginning and intermediate computing, exercises in the case studies method of classroom learning, and a review of writing and mathematical skills.

Program participants learn about class room protocol, expectations, and student life at the school. They have the chance to become familiar with, and settled in, the Boston area, and to become acquainted with fellow students in workshops and social gatherings.

The program is particularly valuable for students who have not attended U.S. colleges or universities. All international students are strongly advised to attend; U.S. students entering the MPH Program are welcome and encouraged to attend. There is no charge for this program.

Orientation Fall 1992

September

7 - 15, Monday-Tuesday	*Advance Seminar Program for MPH and new International Students*
16, Wednesday	*Registration for New Students* *9:00 a.m. - 11:00 a.m. (Last name beginning with A - H)* *11:00 a.m. - 1:00 p.m. (Last name beginning with I - Q)* *1:00 p.m. - 5:00 p.m. (Last name beginning with R - Z)*
17 - 18, Thursday and Friday	*Registration for all Returning Students* *Department and Program Meetings* *Faculty Advisers Available to Meet with Students*
14 - 18, Monday-Friday	*Orientation Programs*

Fall Semester 1992

September

21, Monday	*"a" and "ab" Period Courses Begin* *Last day to Register for Fall Semester (without Late Fee)*

Please note that "a" period courses meeting on Mondays and Wednesdays may have scheduled meetings on Fridays due to the holidays occurring in "a" period. Please check HSPH course schedule for details.

October

2 , Friday	*Drop/Add/Change Deadline for "a" and "ab" period courses* *Cross Registration Deadline for "a" and "ab" period courses* *TAP/Affiliate/Alumni/ae Registration Deadline for "a" and "ab" Period Courses* *Last Day to Register for Fall Semester (with Late Fee)*
12, Monday	*Columbus Day, a holiday*

November

11, Wednesday	*Veterans' Day, a holiday*
13, Friday	*"a" Period Courses End*
16, Monday	*"b" Period Courses Begin*

December

1,Tuesday	*Drop/Add/Change Deadline for "b" Period Courses* *Cross Registration Deadline for "b" Period Courses* *TAP/Affiliate/Alumni/ae Registration Deadline for "b" Period Courses*
26 - 29, Thursday - Sunday	*Thanksgiving Recess*
19, Saturday - January 3, Sunday	*Recess*

January

18, Monday	*Martin Luther King, Jr. Day, a holiday*
22, Friday	*"ab" and "b" Period Courses End*
25, Monday	*Drop/Add/Change Deadline for "e" Period Courses* *Cross Registration Deadline for "e" Period Courses* *Tap/Affiliate/Alumni/ae Registration Deadline for "e" Period Courses*
25 - 29 Monday - Friday	*"e" Period, Inclusive*

Spring Semester 1993

February

1, Monday	*"c" and "cd" Period Courses Begin* *Last Day to Register for Spring Semester (without Late Fee)*

February

12, Friday	*Drop/Add/Change Deadline for "c" and "cd" Period Courses* *Cross Registration Deadline for "c" and "cd" Period Courses* *TAP/Affiliate/Alumni/ae Registration Deadline for "c" and "cd" Period Courses* *Last Day to register for Spring Semester (with Late Fee)*
15, Monday	*President's Day, a holiday*

March

26, Friday	*"c" Period Course End*
March 27, Saturday - April 4, Sunday	*Spring Recess*

March

29, Monday	*Drop/Add/Change Deadline for "f" Period* *Cross Registration Deadline for "f" Period Courses* *TAP/Affiliate/Alumni/ae Registration Deadline for "f" Period Courses*
March 29, Monday - April 2, Friday	*"f" Period, Inclusive*

April

5, Monday	*"d" period courses begin*
16, Friday	*Drop/Add/Change Deadline for "d" Period Courses* *Cross Registration Deadline for "d" Period Courses* *TAP/Affiliate/Alumni/ae Registration Deadline for "d" Period Courses*

May

28, Friday	*"cd" and "d" Period Courses End*
3 , Monday	*Memorial Day, a holiday*

June

10	*Commencement 1993*

Degree Deadlines 1992-1993

For degrees to be awarded November 1992:

September 1, 1992 (Tuesday)
Deadline to submit degree applications to the registrar's office.

November 2, 1992, (Monday)
Deadline to submit bound thesis *to the registrar's office for review by the committee on admissions and degrees.*

For degrees to be awarded March 1993:

January 11, 1993 (Monday)
Deadline to submit degree applications to the registrar's office

March 1, 1993 (Monday)
Deadline to submit bound thesis *to the registrar's office for review by the committee on admissions and degrees.*

For degrees to be awarded June 1993:

March 1, 1993 (Monday)
Deadline to submit degree applications to the registrar's office.

May 21, 1993 (Friday)
Deadline to submit bound thesis *to the registrar's office for review by the committee on admissions and degrees.*

The Harvard School of Public Health

The Challenge

Public health is concerned with preserving and enhancing the health of populations. In the past, public health professionals—including physicians, managers, analysts, and scientists—have been instrumental in eradicating smallpox, developing a vaccine for polio, making progress toward the prevention of tropical diseases and the cure for sexually transmitted diseases, laying the foundation for the study of nutritional deficiencies and their corrections, establishing the field of industrial hygiene, applying statistical methods to the management of diseases, and using behavioral science in the reduction of self-imposed risks.

In the area of preserving and enhancing health, what is the distinction between medicine and public health? Unlike medicine, a well-established profession with a sharp public image, public health has multiple professional identities and a more diffuse image. The Harvard School of Public Health (HSPH) includes approximately 200 faculty members comprised of biostatisticians and epidemiologists, health administrators and educators, nutritional biochemists and cancer biologists, specialists in environmental and occupational health, and experts in behavioral and population sciences. In general, as a personal physician aims to maintain the health and to diagnose and treat diseases in an individual, the goal of the public health professional is to understand and meet the health needs of communities, groups, and nations. Where medicine follows a personal service ethic, conditioned by an awareness of social responsibilities, public health is governed by an ethic of public service, tempered by concern for the individual.

Some of the problems facing public health today include chemical and other hazards in the environment, the threat of new diseases such as AIDS, choices of lifestyle that rob millions of many healthy years, the inappropriate use of medical technology, the widespread inadequacy of health insurance, lack of access to the necessities of life, and the great parasitic diseases that kill and handicap millions around the globe. These represent challenges to which public health professionals continue to devote their energy and expertise.

Our Mission

The Harvard School of Public Health seeks to educate scholars who will understand and help to ameliorate the health problems of society, to promote research that addresses these problems, and to train students to become leaders, advisers, and professional specialists sensitive to the needs of their communities.

The school's research aims to expand the knowledge in health sciences by uncovering the fundamental mechanisms of disease and other causes of ill health in populations, and to improve the allocation of health resources by designing better health interventions, by improving the management of health institutions and systems, and by assisting in the development of health policy. In education, the school's overall goals are to prepare leadership in health, both national and international, for the twenty-first century, to serve the needs for continuing education in the health industry, and to increase public awareness and knowledge about health.

The school's research and teaching activities focus primarily on three areas of societal concern: health promotion and disease prevention, health policy and management, and international health (which combines and applies the first two areas in a broader setting). The programs in health promotion and disease prevention seek to increase our understanding of the factors that produce illness or impair health and to develop methods of preventing or reversing them. Health policy and management attempts to bring sound analytic and decision-making practices to bear upon the more than $350 billion health care industry. Both areas emphasize the training of professional scientists and administrators for positions in research, academe, regulatory agencies, and health service institutions, as well as the advancement of basic scientific research and its application to pressing public health problems. The school serves as a crossroads for international health, attracting health policymakers and public health professionals from dozens of countries.

The History of HSPH

Professional education in public health had been steadily expanding at Harvard University for more than two decades before the actual founding of the School of Public Health in 1922. Its gradual development was characterized by certain important steps. The first occurred in 1909 with the establishment of the Department of Preventive Medicine and Hygiene in the Medical School—the first such department in the United States. The first Doctor of Public Health degree was conferred in 1911, the same year the Department of Sanitary Engineering was established in the Graduate School of Engineering. In 1913, the Department of Tropical Public Medicine was organized in the Medical School, followed in 1918 by the Division of Industrial Hygiene.

Also in 1913, the Harvard-MIT School of Health Officers was formed under the joint management of Harvard

University and the Massachusetts Institute of Technology (MIT). The School of Health Officers operated until the fall of 1922, when it was superseded by the Harvard School of Public Health, made possible by an endowment from the Rockefeller Foundation.

During the early years of the school's operation, several of its departments functioned jointly with counterparts in the Medical School, sharing facilities, faculty, and budgets. In 1946, the school was administratively and financially separated from the Medical School and became an autonomous unit of Harvard University. It continues to cooperate with the Medical School in teaching and research, and has developed close associations with other divisions of the university, particularly the Graduate School of Arts and Sciences, the John F. Kennedy School of Government, and the Graduate School of Business Administration.

The school also maintains a close association with a wide variety of health, medical care, and welfare organizations in Massachusetts and elsewhere. The facilities of hospitals and other institutions located near the school are available to qualified students. Other local, national, and international health facilities provide opportunities for observation and special studies, and members of their staffs assist in the school's educational program. The State Laboratory Institute of the Massachusetts Department of Public Health allows qualified students to obtain experience in laboratory methods pertinent to public health.

Resources

Location The school's main buildings for research, teaching, and administration are located in the heart of Boston's hospital district and Harvard University's Longwood campus. The facilities adjoin those of Harvard's Medical School, School of Dental Medicine, and the Francis A. Countway Library of Medicine, and are near Children's Hospital Medical Center, Beth Israel Hospital, Brigham and Women's Hospital, and other Harvard-affiliated hospitals.

The school is also within walking distance of Boston's Museum of Fine Arts and the Isabella Stewart Gardner Museum, as well as Northeastern University and other colleges.

Public transportation to other parts of Boston is readily available. A shuttle bus, free to those affiliated with the school, runs frequently between the Longwood campus, MIT, and Harvard's Cambridge campus.

Cross-Registration Students at HSPH may enroll in courses offered by other Harvard schools, such as the Medical School, the Graduate School of Arts and Sciences, the John F. Kennedy School of Government, and the Graduate School of Business Administration but not more than half their credit load per semester. Many graduate courses at MIT and at the Fletcher School of Law and Diplomacy at Tufts University are also open to students at the school. Students generally are granted credit toward their degree for such courses, with the exception of courses in foreign languages and undergraduate-level courses.

Some of the most popular courses in the past include: *John F. Kennedy School of Government:* Program Evaluation (M-335), Management Information Systems (M-678), and Health Policy in the United States (S-171); *Harvard Graduate School of Education:* Applied Data Analysis (S-052), Categorical Data (S-060), and Intermediate Statistics (S-030); *Harvard School of Business Administration* : New Ventures in Health Care (1379); *Harvard Medical School:* Clinical Care of Aged Person (705-4); *Massachusetts Institute of Technology:* Cell Biology (790), Regulations: Health and Environment (1.8125), and Tumor Biology (7.62).

Tuition charges for cross-registered courses, including foreign language courses, are included in the HSPH tuition payment. Students who wish to take courses in English as a Second Language at Harvard's Division of Continuing Education must pay an additional tuition fee, ranging from $395 to $790 for a twelve-week session. For further information call 617/495-2531.

Libraries The library needs of the school are served principally by the Francis A. Countway Library of Medicine. The Countway combines the resources and services of the Harvard Medical Library and the Boston Medical Library, making it the largest medical or health-related library in the country. Its recorded holdings include more than 545,000 volumes and 4,000 periodicals. The Countway also owns an extensive collection of historical materials dating from the fifteenth century. Its Rare Books Department provides modern facilities for the use of these books and other rarities.

Students have borrowing privileges at the Harvard College Library in Cambridge and from the libraries of other Harvard schools. Messenger service is provided daily between the Harvard College Library, the Countway Library, and various other Harvard libraries. Some departments within the school also maintain libraries. The Boston Public Library, MIT libraries, and other libraries in the Boston area add to the total book and periodical resources available to students.

Child Care Facilities There are a number of child care facilities in the Longwood campus area and on the Cambridge campus. They are quickly filled, so arrangements should be made as early as possible. For further information, contact the Office of the Child Care Advisor at 617/495-2851. The Medical Center Office for Parenting at 617/432-1615 can also provide information on support services, resources, and programs.

Housing The Henry Lee Shattuck International House is an apartment residence operated by the school on a nonprofit basis for its full-time students and their families from the United States and abroad. Located within walking distance of the school, Shattuck House consists of 72 apartments, each with a kitchenette and bath. All apartments are furnished with basic items except for linens, blankets, and kitchen utensils; no unfurnished units are available.

The Harvard Medical School manages a dormitory located in Vanderbilt Hall which is primarily for Harvard medical and dental students, but HSPH students may live there if vacancies are available. Notices about apartments and other available housing are posted on a bulletin board by the main entrance of Vanderbilt Hall.

Since the demand far exceeds the number of apartments available, applications for Shattuck House should be submitted as soon as possible. Prospective students may apply before they are accepted for admission to the school. For application forms and more detailed information, contact Mrs. Carol O'Connell, Student Affairs Office, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617/432-1034). She is also available to meet with you in regard to other housing options.

The Office of Student Affairs also maintains a card file of available private housing and a list of local real estate agencies.

The Harvard University Housing Office in Cambridge administers housing in other University-owned complexes. Information and application forms may be obtained by writing to the Harvard University Housing Office, 7 Holyoke Street, Cambridge, MA 02138, or by calling 617/495-5239 (out of state: 1/800-252-5020). Students must enclose a copy of their letter of acceptance from the school with their housing application. The Housing Office also maintains listings of apartments and houses not owned by the University. These listings must be viewed in person; information is not given out by mail or telephone.

Instructional Computing Facility The School of Public Health operates its own Instructional Computing Facility (ICF), dedicated to serving the course work and dissertation computing needs of the students and faculty. ICF provides free computing and data processing resources on a variety of systems. These resources include SUN Unix computers, IBM and compatible personal computers, Apple Macintosh computers, a Novell network, and dot matrix and laser printers. A wide array of software is available, including statistical packages, programming languages, analytical programs, and word-processing packages. ICF also provides remote dial-in, file transfer, electronic mail, and connections to national and international networks, such as BITNET and INTERNET. The facility is open daily during the academic year. User assistance is provided by the ICF staff and by the teaching assistants from courses which have computing assignments.

Telephone support, walk-in consultations, documentation, and short courses are also offered throughout the year. In addition, computer accounts for funded research projects are available at a reasonable cost. Individual departments in the school such as Biostatistics and Epidemiology provide their own additional computing resources for their students. Harvard's central computing organization, the Office of Information Technology (OIT), offers members of the University many additional services (some for a fee), such as classes on various computer topics, discounted hardware and software purchases, user groups, technical support, etc.

Health Promotion Task Force

A health promotion task force was established by the Dean to identify ways that the Harvard School of Public Health could improve the health of its own population—students, faculty, and staff. Some of the recommendations of this task force include implementation of the school's no-smoking policy and the establishment of the Center for Health Promotion. The center, within the Department of Health and Social Behavior, coordinates worksite health promotional activities and encourages faculty members involved in health promotional research to commit resources and efforts to make the school an exemplary workplace for students, faculty, and staff. Health education, nutrition awareness, exercise promotion, and the establishment of a drug-free workplace have been some of the actions to date.

The Student Body

The student body includes almost 600 full- and part-time students from throughout the United States and from nearly 50 countries. In terms of occupational background,

approximately thirty percent are physicians. There are also a significant number of health services administrators, epidemiologists, nurses, dentists, lawyers, statisticians, environmental scientists, engineers, research assistants, psychologists, and social workers. There are slightly more women than men, and the average age of the student body is 31. Forty-two percent come from other countries. Many (approximately forty percent) are enrolled in doctoral programs.

Minority Students

Members of minority groups at the school have joined to form the HSPH Minority Student Health Organization. This group meets throughout the academic year, invites speakers, plans special symposia, and sponsors panel discussions on public health issues concerning underserved populations.

The Third World Caucus (TWC) implements programs and addresses issues that have an impact upon minority students at Harvard's Medical School, School of Dental Medicine, and School of Public Health. It comprises four student health organizations on the Longwood campus: Black Health Organization, Boricua Health Organization, National Chicano Health Organization, and Native American Health Organization.

Each fall, the school sponsors a reception to introduce minority students to minority alumni/ae from the Boston area.

The school is committed to increasing its enrollment of underrepresented groups as both students and, as members of the faculty. It recognizes the urgency of increased participation by underrepresented professionals and its impact on the future of health care systems worldwide. The school invites interested minority students to submit an application and become part of our history and future in excellence.

International Students

Many of the students at the Harvard School of Public Health come from outside the United States. The experience they bring with them lends an important dimension to the international health components of the school's academic programs and adds to the diversity of the student population.

Students from abroad are invited to participate in the Host Family Program, administered by the Harvard International Office. This program provides students with the opportunity to get to know an American family who will welcome them and ease their transition to the American way of life.

The Harvard International Office also operates a furniture exchange during the summer and fall to provide low-cost secondhand furniture to students and scholars newly arriving from abroad.

For more information about either the Host Family Program or the furniture exchange, contact the Harvard International Office, 1350 Massachusetts Avenue, Cambridge, MA 02138 (telephone 617/495-3349).

The Office for Students

The Assistant Dean for Students and Admissions, Dr. Cassandra A. Simmons, oversees the administrative activities of the Offices for Students, Admissions, Student Affairs, and Career Services. Dr. Simmons represents the interests of students before the faculty and participates in policy discussion and decision making along with the other deans of the school.

The Office for Students provides comprehensive, broad-based support services to all students at HSPH. It serves students who are diverse in age, experience, and cultural background by helping them understand and better deal with the various aspects of their academic and personal lives. Some of the specific services the office provides include the following: recruiting students and faculty, investigating sources of student financial aid, counseling prospective students, forming liaisons with student groups, dealing with the special needs of students, providing career counseling, and assisting with job searches and/or placements.

The office works with a highly qualified student body and believes that it is important to help students achieve their greatest potential as individuals and to foster their futures as public health professionals. Meeting these goals requires a firm commitment to quality by all office staff members and a continuing responsiveness to changing student and institutional needs and responsibilities.

In fulfilling its mission, the Office for Students reaches out to prospective students, current students, and graduating students through the functions of the following offices:

Admissions Office The cornerstone of the recruitment effort is the emphasis on individual attention and personal contact. Ms. Dolita Cathcart, the Assistant Director, in addition to supervising the staff and operation of the Admissions Office, identifies prospective applicants and advises them about the admissions process, opportunities

offered by departments and programs, and the school's potential contribution to their professional development. Prospective students are encouraged to visit the school, talk with faculty members, visit classes, and meet students. Ms. Cathcart frequently arranges all-day visits, information sessions, and receptions for prospective students, investigates student financial aid resources, counsels prospective and current students, oversees the Minority Student Health Organization, the programming of Black History Month and the annual Hinton Lecture.

Student Affairs Office The Student Affairs Office provides a range of services to students. These services include counseling; tutoring; overseeing the student lounge, lockers, and mailboxes; scheduling classrooms; administering short-term emergency loans; orientation and commencement; and acting as the liaison to handicapped students and to the Student Coordinating Committee. The Student Affairs Office also oversees the Henry Lee Shattuck International House, an apartment residence operated by the school.

Career Services Office The Manager of Career Services, Ms. Andrea Wolf, provides career counseling, programming and resources; job search tools; and networking opportunities for students and alumni/ae to complement the efforts of departments, programs, and faculty advisors. She helps students and alumni/ae to assess skills and goals, explore career options, investigate career resources, write resumes and cover letters, develop interviewing skills, and apply for Fulbright and traveling fellowships. Ms. Wolf conducts numerous workshops covering various aspects of the job search, invites outside speakers to share information about public health career paths and opportunities, and sponsors a special series of workshops/seminars such as "Communication Skills for the Public Health Professional."

The Career Services Office sponsors an annual Career Day in February which draws potential employers representing private and non-profit institutions, international organizations, and governmental agencies at the federal and state levels. This event gives students the opportunity to learn about careers and internships from a wide range of public health organizations, to develop contacts, and to submit resumes.

In the Career Resource Center, students have access to listings of current job openings, information about fellowships and internships, and files on numerous health care organizations. The monthly "Job Opportunities Bulletin" is available to students and alumni/ae. A growing data bank of alumni/ae career advisors has been established in the career office.

For More Information Students interested in the services provided by the Student Affairs Office should contact the Director of Student Affairs, 677 Huntington Avenue, Boston, MA 02115 (telephone 617/432-1034). Questions regarding Career Services should be directed to Ms. Andrea Wolf, Manager of Career Services, 677 Huntington Avenue, Boston, MA 02115 (telephone 617/432-1036). Students with questions concerning the admissions process should contact Ms. Dolita Cathcart, Assistant Director, Admissions Office, 677 Huntington Avenue, Boston, MA 02115 (telephone 617/432-1031).

Alumni/ae Association

The Alumni/ae Association of the Harvard School of Public Health enjoys an active membership of over 6,000 graduates worldwide. The association is governed by a council of twelve members, which meets twice each spring and again during the fall meeting of the American Public Health Association (APHA). Alumni/ae also meet regionally in major cities in this country and abroad. These smaller gatherings are organized by members of the association and the council with assistance from the school. Alumni/ae receptions have been held in Boston, Chicago, San Francisco, New York City, Washington, D.C., and in Amsterdam, Scandinavia, Japan, Taiwan, Germany, and the Netherlands.

In 1981, the Alumni/ae Association was instrumental in establishing the Annual Fund for Student Assistance to help provide tuition scholarships, travel grants, and funding for other student needs.

Members of the Alumni/ae Association have also formed a network for the purpose of providing information to potential applicants to the school. A list of contacts follows this section.

Twice a year, the school publishes the Harvard Public Health Review, the official publication of the Alumni/ae Association. The Review reports on the diverse activities of alumni/ae in many countries and features articles and class news contributed by graduates.

For More Information Please contact Ms. Cynthia J. Hendrix, Director, Annual Fund and Alumni/ae Relations, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-0939.

HSPH Alumni/ae • Applicant Contacts

Below is a list of Harvard School of Public Health alumni/ae who have indicated their willingness to answer questions potential applicants may have about the school. They can respond to queries about departments, curricular matters, possible career opportunities, and alumni/ae activities. These individuals can also refer you to other alumni/ae whose academic and/or career interests more closely match your own and may be able to direct you to a graduate living in your immediate area.

United States

Carolyn W. Arnold, SM '73, SD '77 (Health Services Administration)
Research Associate
Wellesley College Center for Research on Women
Wellesley, MA 02181

Mario Becker, MD, MPH '88, SM '89 (Maternal and Child Health)
400 Brookline Ave., #214
Boston, MA 02215

Janis Curtis, SM '78 (Health Policy and Management)
4224 Mill Village Road
Raleigh, NC 27612

Jean Doherty-Greenberg, DMD, MPH '79 (General Program)
Great Lakes Geriatric Education Center
Chicago College of Osteopathic Medicine
5200 S. Ellis Avenue
Chicago, IL 60615

Johanna T. Dwyer, SM '65, SD '69 (Hygiene)
Lecturer, Harvard School of Public Health
Director, Frances Stern Nutrition Center
Tufts New England Medical Center
750 Washington St.
Boston, MA 02110

Vincent Guinee, MD, MPH '66 (Epidemiology)
3711 San Felipe
Apt. 11A
Houston, TX 77027

Charles T. Kaelber, MD, MPH '67, DrPH '69 (Epidemiology)
Chief, Psychopathology Research Program
Division of Clinical Research
National Institute of Mental Health
5600 Fishers Lane
Rockville, MD 20857

Ruth J. Katz, JD, MPH '80 (General Program)
Counsel
Subcommittee on Health and the Environment
US House of Representatives
2424 Rayburn House Office Building
Washington, DC 20515

Lorna H. McBarnette, SM '79
(Health Policy and Management)
152 Homes Dale
Albany, NY 12208

Wayne F. Peate, MD, MPH '83 (General Program)
PO Box 6003
Greenville, NC 27835

Deborah Rose, SM '75 (Population Sciences)
NCHS
Center Bldg. II, Room 2-44
3700 East West Highway
Hyattsville, MD 20782

Paul R. Torrens, MD, MPH '62 (Health Services Administration)
410 19th Street
Santa Monica, CA 90402

Foreign

Herman Anker, MD, MPH '85 (General Program)
22 Gregers Gramsvei 0383
Oslo, Norway

Ninette Ravji Banday, BDS, MPH '82 (General Program)
109/1 Shahrah-e-Iran
Clifton, Karachi, Pakistan

Alessandro de Franciscis, MD SM '85 (Epidemiology)
Vigna Brigida
Tuoro di Caserta 81029, Italy

Susan S. Irvine, MD, MPH '81, SM '82 (Health Services Administration)
292A Old South Head Road
New South Wales, Watson Bay, Australia

Shin-Yang Liu, MD, MPH '80 (General Program)
153 Chung-Hsiao E Road
Section 4-2F
Taipei, Taiwan, Republic of China

Isidore S. Obot, PhD, MPH '85 (Behavioral Sciences)
University of Jos
Dept. Psychology, PMB2084
P.O. Box 10331
Jos, Nigeria

Sun-Dae Song, MD, SM '82 (Maternal and Child Health)
National Kong-Ju Hospital
Kong-Ju, Seoul, Korea 314-1

Jose Augusto C. Taddei, MD, MPH '80 (General Program)
Rua Conde de Bonfim 1271
Apt. 419
Rio de Janeiro, Brazil 20530

Boukje Van Noord-Zaadstra, MPH '81, SM '82 (Epidemiology)
Netherlands Inst. of Preventive Med.
NIPG Child Health Division
Wassenaarseweg 56, Postbus 124
Leiden, Netherlands 2300

Degree Requirements

The Harvard School of Public Health offers programs leading to the graduate degrees of Master of Public Health (MPH), Doctor of Public Health (DPH), Master of Occupational Health (MOH), Master of Science (SM) in a public health discipline, and Doctor of Science (SD) in a public health discipline.

In general, the master's degrees are viewed as terminal degrees for individuals who seek professional positions in public health. In a few departments, however, the SM is intended as preparation for doctoral study. The doctoral programs are designed for students with interests in the scientific basis of public health and preventive medicine who wish to pursue academic or research careers.

Background of Applicants For all programs, the School's Committee on Admissions and Degrees considers applicants' academic ability, the relevance of their previous education and experience, and their overall qualifications for graduate professional education in public health, including those qualities of character which reflect upon an individual's suitability to be a public health professional. Applicants must also satisfy the requirements of the department or program to which they are applying to, and show that their background is appropriate. Applicants to doctoral programs must demonstrate the ability to undertake original research, and are encouraged to contact the department of their interest for more information.

Most courses at the school require students to write papers, reports, and take examinations; doctoral students must also complete a thesis. All programs require course work in quantitative areas. Students who are not confident of their writing and/or math ability are advised to brush up on these skills, taking refresher courses if necessary, before coming to the school.

Students are normally required to submit written assignments in typed, rather than handwritten, form. Since it is expensive to hire a typist, it is useful for prospective students to have gained some typing skill before entering the school. It is also helpful for entering students to be familiar with basic wordprocessing and spreadsheet software such as WordPerfect and Lotus 1-2-3.

For More Information Because specific prerequisites and degree requirements vary with the discipline or field of specialization, prospective applicants should consult the sections of this book which describe departmental and interdisciplinary degree programs. All applicants are required to submit official scores from the Graduate Record Examination (GRE); details about this requirement and other information about admissions procedures can be found in the section, Admission • Registration • Financial Aid. For any questions not answered in this Official Register, please write to your department of interest or to: Ms. Dolita Cathcart, Assistant Director, Admissions Office, HSPH, 677 Huntington Avenue, Boston, MA 02115 (telephone 617/432-1031).

Master of Science

The Master of Science (SM) programs differ considerably from department to department, both in their overall goals and in their specific admission and degree requirements. An applicant may be admitted to an SM program in more than one discipline, if the program meets the requirements of both departments involved: i.e., the degree conferred specifies both fields. An applicant may be admitted to either a one-year or a two-year program, as described in this section.

Background of Applicants An applicant with a bachelor's degree is normally considered for admission to a two-year program. A year or more of appropriate graduate work occasionally enables a student to fulfill the requirements of certain two-year programs in one or one-and-a-half years.

Students in the one-year SM program generally hold doctoral degrees in medicine, dentistry, veterinary medicine, or in another field relevant to the department(s) to which admission is sought.

Applicants holding master's degrees may be considered for admission to one-year or two-year programs, depending upon their prior educational and professional background and the particular requirements of the program to which they wish to apply.

Requirements for the Degree Students enrolled in a one-year program must successfully complete at least 40 credit units, and those in a two-year program, 80 credit units. Unless they can demonstrate equivalent preparation, candidates for the SM degree must fulfill basic requirements in biostatistics and epidemiology, as follows:

1. BIO 200ab, Introduction to Statistical Methods (5 units) or BIO 201ab, Principles of Biostatistics (5 units) or BIO-HPM 203b, 203c, 203d, Statistical Methods for Health Policy and Management (Module I, II, III) (2.5 units each period)

2. EPI 200a, Introduction to Epidemiology (2.5 units) or EPI 201a, Principles of Epidemiology (2.5 units)

Applicants to programs in the biological sciences who lack a background in medicine or biology are advised to take EH 205ab, Human Physiology, or a course in

general biology elsewhere. Beyond these minimal course requirements, each department may specify additional courses that are necessary to satisfy degree requirements in the particular area of specialization.

Master of Occupational Health

The program leading to the degree Master of Occupational Health (MOH) is designed to train physicians in the public health disciplines relevant to preventing occupational disease and injury. This one-year degree program is usually taken as part of a two-year approved residency in occupational medicine. Additional information on the program can be found in the description of the Department of Environmental Health.

Background of Applicants: Candidates must be graduates of an approved school of medicine. Individuals from the United States should have completed an internship or residency of at least 12 months in a hospital approved by the American Medical Association.

Requirements for the Degree Candidates for the MOH degree spend one year in residence at the school and must complete a program of at least 40 credit units. All candidates must take the following courses unless they can demonstrate equivalent preparation. The required courses comprise 30 credit units; additional courses may be selected from the curriculum approved for residencies in occupational medicine.

1. BIO 201ab, Principles of Biostatistics (5 units)
2. EH 231cd, Occupational Health Policy and Adminis tration (2.5 units)
3. EH 232cd, Introduction to Occupational Medicine (2.5 units)
4. ID 263bc, Practice of Occupational Health (5 units)
5. EPI 201a, Principles of Epidemiology (2.5 units)
6. EPI-EH 215cd, Environmental and Occupational Epidemiology (2.5 units)
7. TOX-EH 204ab, Principles of Toxicology (5 units)
8. EH 243ab, Ergonomics/Human Factors (2.5 units) or EH 241cd, Occupational Safety (2.5 units)
9. HSB 200ab, Social and Behavioral Dimensions of Public Health (2.5 units)

Not required, but strongly recommended: BIO 210cd, The Analysis of Rates and Proportions (5 units) or BIO 211cd, Regression and Analysis of Variance in Experimental Research (5 units).

The Doctoral Degrees

Doctor of Science

The Doctor of Science Degree (SD) is granted upon successful completion of a program of independent and original research in one of the basic disciplines of public health, the presentation of this research in an acceptable thesis, and by meeting the school's residency requirement.

Because specific prerequisites and degree requirements vary with the discipline or field of specialization, prospective applicants should consult the sections of this book which describe departmental and interdisciplinary degree programs. They are also encouraged to contact the department or program to which admission is sought for more detailed information.

An applicant may be admitted to a doctoral program in more than one discipline, if the program meets the requirements of both departments involved.

Background of Applicants Applicants to the SD program must hold at least a bachelor's degree. In some instances an applicant will be expected to complete the SM degree at the school before being granted admission to doctoral study, in which case the student will first be admitted to an SM program.

Requirements for the Degree Students enrolled in the SD program must complete the residency requirement by paying two years of full-time tuition and one year of full-time reduced tuition and by maintaining satisfactory progress in an academic program approved by the department(s) of concentration and by the Committee on Admissions and Degrees within the doctoral student timetable.

In addition to satisfying the residency requirements, doctoral students are required to complete a minimum of 40 credit units in graduate level courses distributed over one major and two minor fields. Each minor field consists of at least 10 credit units in formal classes. Such requirements may be increased in cases where there has been a substantial shift in field or where the student has declared two major fields, or reduced in cases of prior relevant course work or experience. (However the residency requirements described above must still be fulfilled.) Courses in the major and minor fields must be completed with grades of B- or better.

Unless equivalent preparation can be demonstrated, doctoral students must take one of the introductory epidemiology courses (EPI 200a or EPIa), as well as courses in biostatistics at an intermediate level (ordinarily BIO 210cd, The Analysis of Rates and Proportions, or BIO 211cd, Regression and Analysis of Variance in Experimental Research). Departments may stipulate specific course requirements and normally require written and/or oral examinations on the course work in the three fields.

Qualifying Examination By the end of the second year, students should be prepared to take the oral qualifying examination, which is intended to assess a student's potential to perform research in his or her chosen field. Since most doctoral research in the school requires a substantive knowledge of more than one discipline or field, the examining committee includes faculty from disciplines representing the minor fields as well as the major field, the examination includes questioning in both the minor and major fields.

A research committee consisting of the student's advisor and other faculty members should be appointed within one month after the qualifying examination is passed. The committee guides the student's research through to completion, meeting with the student at least once every six months to discuss details of his or her progress.

Thesis An acceptable thesis must be submitted within five years of the date of registration as a doctoral candidate. Occasionally, upon approval of the student's research committee and of the Committee on Admission and Degrees, and only after the successful completion of the Oral Qualifying Examination, thesis work may be performed in nonresident status. The thesis consists of one or more manuscripts suitable for publication in a specific medium appropriate to the candidate's field. A thesis is accepted only after a public presentation and discussion has been held, with the research committee in attendance.

The handbook, Guidelines for Doctoral Students, is distributed during fall registration. This guide outlines in greater detail the requirements and procedures of the doctoral programs.

Doctor of Public Health

Like the SD degree described above, the Doctor of Public Health (DPH) is an advanced degree which is granted upon successful completion of an approved program of independent and original investigation in a special field of public health and the presentation of the results of this research in an acceptable thesis. Formal requirements for the DPH program are the same as those for the SD. The primary difference between the two programs lies in the background of the degree candidates.

Background of Applicants Most applicants for admission to the DPH program hold a doctoral degree in medicine, dental medicine, or veterinary medicine. Depending on the intended field of specialization, consideration may also be given to a candidate who holds an advanced degree in one of the disciplines basic to public health. The applicant must also hold, or be in progress toward the MPH degree, or its equivalent, from an approved institution.

Master of Public Health Program

Gareth M. Green, MD, Program Director and Associate Dean for Professional Education

The program leading to the Master of Public Health (MPH) degree is designed to prepare health professionals for leadership in public health. A significant focus is the preparation of mid-career professionals for advancement in their field or for transition to a new area. Graduates work in diverse fields including management, policy, research, and academic positions in the public and the private sector.

Program Description The Program begins with core courses in the basic public health disciplines of biostatistics and epidemiology, biological and environmental health sciences, behavioral and social sciences, public health policy and management, and public health practice. The core courses account for approximately one-half of the credit units taken.

Concentrations

All applicants to the MPH Program select one of the five concentrations offered. Within a concentration, students pursue in depth one or more areas of particular relevance to their career goals.

International Health prepares health professionals for leadership roles in international health, especially the health care of disadvantaged populations in developing countries. Areas of special interest include international health policy and management, health economics and the financing of health care, population, reproductive health, nutrition, child health, and infectious disease epidemiology and ecology.

Health Care Management prepares graduates to evaluate medical practices or to administer large health care institutions, primarily in the private sector. Tracks are offered in finance and reimbursement, quality of care and risk management, technology assessment and decision analysis, operations and personnel management, dental care management, and health care law.

Public Management and Community Health prepares graduates for leadership positions within the public sector, including federal, state, and local health departments and community health settings. Tracks are offered in maternal and child health, finance and regulation of health services, mental health and substance abuse, health promotion and disease prevention, and public health law.

Occupational and Environmental Health provides training in toxicology, epidemiology, industrial hygiene and safety, legal and policy issues, and occupational health management. Physicians completing the track in occupational medicine will satisfy the American Board of Preventive Medicine requirement for didactic training in occupational medicine. Tracks include occupational medicine, occupational health, and environmental health.

Quantitative Methods prepares students for professional careers that utilize a high level of quantitative skills, including epidemiology, biostatistics, decision sciences, demography, and evaluation.

Degree Requirements MPH degree candidates normally complete the program in nine months of full-time study at the School. A minimum of 40 credit units is required, but students are encouraged to take a total of 45 to 50 credit units. In some instances, with the approval of the Committee on Admissions and Degrees, a student may complete the program by enrolling half-time over a period of two academic years. To supplement their studies, students may take courses in other faculties of Harvard University such as the Law School, Medical School, John F. Kennedy School of Government, Graduate School of Education, Graduate School of Arts and Sciences, and Harvard School of Business Administration.

Background of Applicants MPH students come from all parts of the world, bringing to the Program a wide variety of backgrounds and experiences. Most applicants to the MPH Program have completed a degree in medicine, dentistry, veterinary medicine, nursing, or law. Applicants with a doctoral degree in a field important to public health (such as biology, behavioral sciences, nutrition, other natural and social sciences, economics, or engineering) are also considered for admission.

Consideration may be given to applicants who have a master's degree in a field closely related to public health and substantial relevant post-graduate professional experience, usually at least three years in an administrative position of responsibility. The particular interests of certain populations (noted below) are served by specially assigned advisors and specific seminars and courses.

Medical and Dental Students

Students enrolled in an MD, DMD, DDS, or DVM program and who have a possible career interest in public health and preventive medicine may apply for concurrent admission to the MPH Program. A combined program must meet the approval of both the Committee on

Admissions and Degrees and the institution from which the doctoral degree will be awarded. A planned approach to joint degree training is necessary. Students should apply early in their doctoral training to allow for maximum flexibility in acquiring credentials for both degrees. Requirements for the MPH degree are the same for students in the combined degree program as for all other MPH degree candidates. Students in this program receive the MPH upon successful completion of both degree programs and conferral of the doctoral degree.

Preventive Medicine Residency
The MPH Program also serves as a required academic year for residency training in preventive medicine, aerospace medicine, or occupational medicine. The occupational medicine residency is described in the material on the Department of Environmental Health. Students planning to qualify for certification in preventive medicine should declare this intent and review their planned curriculum with the MPH Office at the beginning of the school year to assure that it meets all requirements.

Lawyers
The dramatic expansion of legal and regulatory issues in health fields has resulted in a critical need for lawyers with formal training in the health sciences and public health disciplines. Growing specialty fields include hospital and health care law, personal injury and compensation law, environmental health law, occupational health and safety law, and child health law. To help meet the need for trained professionals in these areas, the Harvard School of Public Health invites lawyers to apply to its MPH Program.

Lawyers may pursue a comprehensive program in the health sciences and medical care delivery, or may tailor their programs to pursue special interests such as public health regulation, medical malpractice and risk management, health care finance regulation, environmental and occupational health regulation, biomedical and pharmaceutical industry regulation, international health law, and human rights and health.

Additional Degrees Some students choose to continue their studies at the School after completing the MPH degree. These students may apply for a Master of Science or doctoral program in any of the departments which offer such programs. Students who apply for a second degree after the MPH may want to consider a practicum/field placement during the summer between the two programs.

For More Information Write to Roberta Gianfortoni, Assistant Director of the MPH Program, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-0090.

For the lawyers' program contact Georgiana White, Department of Health Policy and Management, Harvard School of Public Health, or call 617/432-1090.

Dentists may contact Dr. Chester W. Douglass at the Harvard School of Dental Medicine, or call 617/432-1456.

Department of Biostatistics

Nan M. Laird, Henry Pickering Walcott Professor of Biostatistics and Chair of the Department

Faculty Professors D. Harrington, Lagakos, Pagano, Robins, Rosner, Tsiatis, Ware, Wei, Weinstein, and Zelen; Visiting Professors Bagliro, Cheng and Patel; Associate Professors Finkelstein, Gelber, Gelman, Gray, Greenes, Orav, L. Ryan, and Schoenfeld; Assistant Professors Davis, DeGruttola, Gatsonis, Gonin, Hughes, Kalish, Kim, Lefkopoulou, Lipsitz, Propert, Rotnitzky, Spino, Spiegelman, Waternaux, Williams, and Wypij; Lecturers Amato, Stanley, Testa, and Wyshak

Adjunct Faculty Associate Professors Lavori and Mehta

The programs in the Department of Biostatistics prepare students to contribute to the theory and practice of statistical science as applied to health. The department's research in statistical methods and its interdisciplinary collaborations provide many opportunities for student participation. The school and the department have computing facilities which support all the commonly used statistical packages.

The faculty includes leaders in the development of statistical methods for clinical trials and observational studies, studies on the environment, animal experiments, and longitudinal studies. Members of the department serve on a large number of national and international advisory committees.

The department sponsors several working seminars to foster student and faculty interest in current research areas. The working seminar topics for the 1991-92 academic year were health decision sciences, longitudinal data, psychiatric statistics, statistical issues in the environment, statistical methods in epidemiology, and statistical methods in HIV and cancer clinical research.

An introductory course in biostatistics is required of all students in the school; many students take additional courses in the department. The department offers courses at the elementary, intermediate, and advanced levels. Elementary courses assume little background in mathematics and are designed for a wide audience. These courses develop facility in quantitative reasoning, a command of basic methodology, and a critical appreciation of good statistical practice in the health sciences. Intermediate courses are designed to develop methodological skills in specific areas of application, such as epidemiology, health policy, and experimental science. Advanced courses require a strong background in mathematics and are primarily intended for degree candidates in biostatistics.

Current Departmental Research

- Statistical methodology in environmental research, including health effects of indoor and outdoor air pollution, carcinogenicity testing, environmental monitoring, carcinogenic and teratogenic effects of chemicals

- Research and development of statistical and computing methods for clinical trials, including sequential methods and survival models; environmental and epidemiologic research, including methods for longitudinal studies; analyses with incomplete data; meta-analysis; and statistical aspects of the study of AIDS

- Collaborative clinical research in the treatment of cancer and AIDS in more than 200 national and international clinical trials

- Quantitative problems in health risk analysis, technology assessment, and clinical decision making, including new methods for assessing risks and benefits associated with environmental regulations

- Statistical methodology in psychiatric research, collaborative research in mental health, including clinical psychopharmacology trials, longitudinal naturalistic studies and family studies

- Collaborative research activities with biomedical scientists at the Harvard Medical School and affiliated hospitals

Degree Programs Master of Science in Biostatistics, Doctor of Science, Doctor of Public Health for the MPH degree, please refer to the Master of Public Health Program on page 14.

Programs

Biostatistics
Health Decision Sciences

Biostatistics The main program in the department is biostatistics. Both the master's and the doctoral programs provide rigorous training and practical experience in statistical methods for the biomedical sciences. The primary emphasis of the department is doctoral training; course offerings reflect this orientation. The department offers a master's program mainly to prepare students for doctoral study, but qualified students can pursue the master's degree only.

Required course work includes probability, statistical inference, statistical methodology, and epidemiology; electives include advanced courses in biostatistics as well as courses in the biomedical sciences and health policy and management. Students are given experience in computing and have the opportunity to teach in the department's school-wide courses. They also develop consultative and data analytic skills through participation in the activities of the Biostatistics Consulting Laboratory.

At the end of their third semester, doctoral candidates are required to take and pass a written qualifying examination and in the following twelve months make an oral presentation of research plans. Students who enter the doctoral program with a master's degree in biostatistics or statistics are encouraged to take the written qualifying examination in their first year of study. The doctoral thesis may include either original contributions to statistical methodology related to the health sciences or an innovative application to a field of public health or medicine.

Health Decision Sciences This program offers training in quantitative techniques in decision making at individual (clinical) and collective (policy) levels. In addition to core courses in probability and biostatistics, students take courses in decision analysis, cost-benefit and cost-effectiveness analysis, operations research, applied economics, behavioral decision theory, and computing. Applications to medicine, health care policy, and environmental risk analysis are emphasized. This is a joint program with the Department of Health Policy and Management; students in this program may be enrolled in either department.

Concentrations

The department offers special concentrations in three areas of predoctoral training under funding from the National Institutes of Health: statistical methods in cancer

research, environmental health, and psychiatric biostatistics. Students in all concentrations complete the regular training program in Biostatistics, with additional substantive coursework in their area of concentration. Students also participate in relevant working seminars in their concentration, and engage in faculty supervised internships during the summer.

Background of Applicants Applicants to programs in biostatistics should have strong preparation in mathematics and an interest in the health sciences. It is recommended that the mathematical preparation include at least one year of analysis past elementary calculus and linear algebra. Knowledge of a high-level computing language, such as C, FORTRAN, or PASCAL, is also recommended.

Students may enter the doctoral program directly or as a sequel to the master's program. Students entering the doctoral program as a sequel to the master's program are expected to take the written qualifying examination in the first year of the doctoral program. The path to the doctoral program depends on the student's level of preparation at the time of application. Students desiring a doctorate are encouraged to apply directly to the doctoral program. Doctoral applicants with insufficient preparation will be considered for the master's program.

Career Outlook The career outlook for biostatisticians is excellent. There are many more open positions than available candidates. The shortage of biostatisticians is expected to continue through this decade. Recent graduates have assumed faculty posts at universities and schools of public health and positions in research laboratories and centers in the federal government, in pharmaceutical companies, and in research institutes.

For More Information write to the department chair, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1056.

Department of Cancer Biology

Myron E. Essex, Mary Woodard Lasker Professor of Health Sciences and Chair of the Department

Faculty Professors Antoniades, Glimcher, Haber, Haseltine, Hirsch, and Little; Associate Professors Kelsey, Lee, Liber and Sodroski; Assistant Professors Grusby, Kanki, Nickoloff, and Yandell; Visiting Assistant Professor Carini

Adjunct Faculty Professor Mullins

The Department of Cancer Biology is primarily involved in research into the causes of cancer and offers training programs in basic and applied research leading to the Doctor of Science degree. Research activities are centered in the department's Laboratories of Radiobiology; Immunology; and Virology.

Current Departmental Research

- Precise changes in DNA sequences produced by radiation and chemical carcinogens
- Mechanisms of mutagenesis and DNA recombination
- Induction of mutation and malignant transformation in mammalian cells by low and high LET radiations and by chemical agents
- Cytogenetic effects of physical and chemical carcinogens
- Activation of proto-oncogenes and loss of tumor suppressors in carcinogenesis
- Role of viruses in the cause of cancer, including hepatitis B virus and human liver cancer, and RNA tumor viruses as causes of leukemias, lymphomas, other tumors, and immunosuppressive disorders of animals and man; pathogenesis of AIDS and characterization of the family of retroviruses associated with this disease
- Tumor immunology, the molecular biology of cancer, gene regulation, and genetic events associated with the induction of leukemia and immunosuppressive disease

Degree Program Doctor of Science

Areas of Concentration
Radiobiology and Carcinogensis
Immunology
Virology

The department aims to develop the basic skills in laboratory techniques and data handling necessary for undertaking original research. Course work during the first one to two years emphasizes cancer biology, cellular and molecular biology, virology, immunology, radiation biology, and genetics. Additional courses are available in several areas of microbiology, biochemistry, and cell biology at the Harvard Medical School, at other Harvard schools, and at MIT. Students are encouraged to participate in the

numerous seminar series and informal discussion groups offered at the Longwood campus. The department emphasizes publication of research results in the standard research literature. Most doctoral students in the department publish several papers before completing the degree. The latter part of the degree program involves intensive laboratory research under the guidance of a faculty advisor in the student's area of concentration.

Background of Applicants Applicants with a clinical degree in medicine, dentistry, or veterinary medicine are encouraged to apply to the Department. All other applicants will be screened by the Division of Biological Sciences (see page 36) before being referred to the department for further review.

Career Outlook Typical positions taken by recent graduates include postdoctoral research fellowships, junior faculty positions at academic institutions, and positions in independent research institutes, in governmental agencies, and in the biotechnical industry.

For More Information write to Ms. Jacqueline Breen, Department of Cancer Biology, HSPH, 665 Huntington Avenue, Boston, MA 02115, or call 617/432-0975.

Department of Environmental Health

Joseph D. Brain, Cecil K. and Philip Drinker Professor of Environmental Physiology and Chair of the Department

Faculty Professors Drazen, Fredberg, Green, J. Harrington, Moeller, Monson, Smith, Speizer, and Spengler; Associate Professors Burge, Christiani, Dockery, Evans, Kelsey, Koutrakis, P.B. Ryan, and Yanagisawa; Assistant Professors Ford, R. Goldman, Hu, Kobzik, Milton, Paulauskis, Shea, Shore, and Warner; Senior Lecturer Sherwood; Lecturers Rudnick, Shapiro, and Snook

Adjunct Faculty Associate Professors Butler, Eisen, H. Feldman, and Valberg; Assistant Professor Hashimoto; Lecturer Nobel

The Department of Environmental Health is concerned with the detection and prevention of adverse health effects caused by chemical and physical factors in occupational and community settings. The problems are complex and require the insights of many specialties. The department's faculty, research staff, and students reflect the multidisciplinary nature of the field and include applied mathematicians, chemists, engineers, epidemiologists, physicians, occupational health nurses, physiologists, and physicists.

Several of the programs offer financial support to qualified individuals on a competitive basis.

Current Departmental Research

- Inhalation toxicology; comparative respiratory physiology; and deposition and clearance of particles in the respiratory tract
- Cell and molecular biology of the respiratory system, especially lung macrophages
- Acute and chronic epidemiologic studies of working and community populations exposed to various toxic materials
- Mechanical properties of lungs and chest wall, development of pulmonary function tests and testing equipment, and application of these methods to the study of respiratory disease in occupational and community environments
- Micromechanics of lung parenchyma, stereology, roles of surface and tissue stress-bearing elements
- Neurophysiology of respiration
- Design and evaluation of local exhaust systems and respiratory protection devices for the protection of workers
- Measurement and modeling of personal exposures to gases and aerosols: ozone, carbon monoxide, nitrogen dioxide, volatile organic compounds (i.e., formaldehyde, benzene), nicotine, fibers, metals, and acidic aerosols
- Instrumentation for collection of particles and pollutant gases in industrial and environmental conditions; measurement of acid gases and particles
- Indoor and outdoor measurement and modeling
- Development and application of biological markers of exposure and disease in animals and humans
- Transport, transformation, and removal of environmental contaminants
- Airway physiology and pharmacology, asthma, chronic diseases of airways
- Statistical and methodological issues in the analysis of data from occupational and environmental health studies

- Analysis of approaches for efficiently collecting exposure information in support of environmental control decisions
- Risk assessment and evaluation for hazardous waste sites and energy sources
- Control of naturally occurring radon and radon daughter products in homes
- Protecting the public in case of a nuclear accident
- International occupational and environmental health studies in collaboration with researchers in Mexico, China, Spain, Republic of Korea, Taiwan, the Nether lands, Germany, and other countries

Degree Programs Master of Science in Environmental Health Sciences, Master of Science in Physiology, Master of Occupational Health, Doctor of Science, Doctor of Public Health. See MPH section for MPH in Occupational and Environmental Health on page 14.

Programs and Concentrations
Environmental Epidemiology
Exposure Assessment and Engineering
Environmental Health Management
Environmental Health Sciences
Industrial Hygiene and Occupational Safety
Occupational Health
Industrial Hygiene and Occupational Safety
Occupational Health Nursing
Occupational Medicine
Occupational Safety and Health
Respiratory Biology

Career Outlook Some positions taken by recent graduates of the various programs offered by the Department of Environmental Health include: industrial hygienist with the U.S. Department of Labor, the State of Rhode Island, and the Aluminum Company of America; assistant director, NIOSH; epidemiologist, United Auto Workers Union; coordinator of environmental quality, state of Oregon; environmental engineer and scientist in government and industry; and assistant professor in schools of medicine, public health, and nursing.

Environmental Epidemiology
Frank E. Speizer, Professor of Environmental Science and Director of the Program in Environmental Epidemiology

This program offers training at both the master's and doctoral level in preparation for research careers in environmental epidemiology. Major work at present is directed toward assessing the possible effects of sulfur oxides, nitrogen dioxide, ozone, particulate matter, acid aerosols, and other pollutants on respiratory disease. Adults and children are being studied in long-term follow-up studies, cross-sectional cohort studies, and short-term panel studies. Exposure measurements are being refined through monitoring of specific chemical species, indoor monitoring in homes and schools, and personal sampling. In addition, more sensitive measures of health response are being implemented. The range of population exposures is being expanded through collaborative investigations in extremely polluted developing countries, for example, Mexico, China and Czechoslovakia. A rich data base of pollution and health measurements is available for collaborative research by students.

Background of Applicants Candidates are generally doctoral students or postdoctoral trainees with qualifications in medicine or biostatistics.

For More Information write to Dr. Douglas W. Dockery, Asst. Director of the Program in Environmental Epidemiology, HSPH, 665 Huntington Avenue, Boston, MA 02115.

Exposure Assessment and Engineering
John D. Spengler, Professor of Environmental Health and Director of the Program in Exposure Assessment and Engineering

This program emphasizes the chemical, physical, microbiological and engineering aspects of environmental assessment and control. Master's and doctoral degree programs are offered in Environmental Health Sciences, Environmental Health Management, and Industrial Hygiene and Occupational Safety.

Background of Applicants Exposure Assessment and Engineering candidates normally have a bachelor's degree in engineering, chemistry, physics, mathematics, or biology. Preparation in the sciences ordinarily includes courses in differential and integral calculus, general and organic chemistry, and physics (mechanics). The master's degree is normally earned after two years. Applicants with exceptional undergraduate credentials, advanced degrees, or two years or more of relevant experience may request consideration for admission to a one-year SM program.

In addition to the school-required basic biostatistics and epidemiology, all students take basic environmental science courses which include exposure assessment, environmental chemistry, physiology, and environmental/industrial toxicology. Advanced courses in environmental science may have a wide scope or may be oriented toward a specific medium (such as air, surface water, or groundwater) or pollutant (such as ionizing radiation); they may focus on monitoring, modeling, or the control of the pollutants.

Environmental Health Sciences The master's and doctoral programs in environmental health sciences may focus on specific problem areas, such as: air and water quality and control or radiological health (radiation protection)

Environmental Health Management The master's and doctoral programs in environmental health management are intended for students interested in quantitative approaches to the evaluation and management of the environment. In addition to the basic and selected advanced environmental science courses described above, students complete courses in data analysis and decision sciences.

Courses in data analysis and inference include more advanced topics such as multiple regression and analysis of variance. The required courses in decision sciences familiarize students with concepts and techniques from risk assessment, operations research, statistical decision analysis, and economics.

These courses are supplemented by electives, such as environmental law, environmental and natural resource policy, environmental or regulatory economics, computer science, and cancer biology. Some of these electives are offered in other Harvard schools or at MIT. Students particularly interested in hazardous waste management or groundwater contamination normally take about one-third of their courses outside the Harvard School of Public Health. Students are encouraged to participate in summer internships.

Industrial Hygiene and Occupational Safety The master's and doctoral programs in industrial hygiene and occupational safety are designed to help meet the demand for professional personnel with the skills and scientific knowledge needed to identify and control health problems of the workplace. In addition to the basic and selected advanced environmental science courses described above, the core curriculum also includes courses in manufacturing processes, safety and ergonomics, and radiological health. Additional courses in risk assessment, policy and administration, and occupational/environmental law are available.

Internship Program Students specializing in industrial hygiene normally participate in the internship program in which they work for six months (June-December) in positions coordinated by faculty. The work may include assessment and control of toxic substances, noise, radiation, heat stress, etc. Students earn salary as well as credits toward a 60-credit or 80-credit Master of Science degree. Normally, internships begin after second semester with the student returning for the spring semester of the second year.

For More Information write Mrs. Linda Fox, Program Administrator, HSPH, 665 Huntington Avenue, Boston, MA 02115, or call 617/432-3351. Doctoral applicants should contact Mrs. Fox to arrange an interview with faculty in the program.

Occupational Health

Richard R. Monson, Professor of Epidemiology and Director of the Educational Resource Center for Occupational Safety and Health

The training programs in occupational safety and health listed below are offered through the NIOSH-sponsored Educational Resource Center for Occupational Safety and Health at Harvard (see Centers and Offices): In addition to the master's program described below, physicians, nurses, and others interested in occupational health may apply for training at the doctoral level.

Industrial Hygiene and Occupational Safety The two-year master's program in industrial hygiene and occupational safety is an integral component of the Educational Resource Center for Occupational Safety and Health. Admissions and curriculum are administered through the department's Exposure Assessment and Engineering program unit, described on page 19.

Occupational Health Nursing A two-year educational program for the preparation of graduate nursing students at the master's level in occupational health and occupational health nursing is offered by the Educational Resource Center. The curriculum prepares students in the practice of occupational health nursing and in the basics of occupational health research, reflecting and promoting diversified and expanded roles in this specialty practice. Upon completion of degree requirements, a Master of Science in Physiology (Occupational Health) degree is awarded.

The program places major emphasis on identification of health hazards, workplace assessment, program planning and intervention, worker health promotion, and disease and injury prevention. The training includes courses in occupational health, industrial hygiene, epidemiology,

biostatistics, toxicology, occupational health nursing, health behavior, administration, and policy. Industrial settings, clinics, hospital-based occupational health programs, and agencies serve as practicum placement sites. Research activities include pilot epidemiologic studies, collaborative projects, and surveillance activities culminating in a research paper.

Background of Applicants Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League for Nursing and three years of nursing experience, preferably in occupational health nursing. In addition to an application to the degree program, applicants must show evidence of satisfactory completion of a basic statistics course, and registration to practice nursing in a state or territory.

For more information about the program and financial support which may be available for United States citizens or permanent residents through traineeships or scholarships, write to Ms. Susan Legendre, Occupational Health Program, HSPH, 665 Huntington Avenue, Boston MA 02115, or call 617/432-3327.

Occupational Medicine The one-year program in occupational medicine leads to either the Master of Occupational Health (MOH) or the Master of Public Health (MPH) degree. Physicians are trained in the public health disciplines relevant to the prevention and control of occupational disease and injury. The coursework includes epidemiology, biostatistics, occupational medicine, toxicology, industrial hygiene, ergonomics/safety, health policy, and administration.

The practicum year of the Occupational and Environmental Medicine Residency at the Harvard School of Public Health emphasizes the development of skills in clinical occupational medicine and occupational epidemiology. During this year, acquired knowledge and abilities are applied to patient management and workplace problem-solving, and at least one short-term research project is designed, executed, and documented under faculty supervision. Field experience includes rotations through hospital-based occupational health clinics, the Massachusetts Division of Occupational Hygiene, and corporate medical departments.

The Harvard School of Public Health Occupational and Environmental Medicine Residency is fully accredited by the Accreditation Council for Graduate Medical Education to offer the didactic training outlined above and a practicum year leading to board eligibility in occupational medicine. Dr. David C. Christiani is director of the residency.

Some financial support for residency candidates who are United States citizens or permanent residents may be available through traineeships or National Research Service Awards.

Background of Applicants Physicians currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission. The two-year residency is open to candidates who have completed at least one year of clinical training in internal medicine or family practice; in addition, board eligibility or certification in a primary care specialty is preferred.

Admission to the Program In addition to an application to the degree program, applicants should send a letter of interest to the Occupational Health Program at Harvard University, enclosing a curriculum vitae listing medical training and experience, research experience, and publications. Admission to the practicum year of the residency is a separate process from admission to the degree program, but usually occurs shortly after admission to the degree program. Regardless of initial acceptance, continuation into the second year of the residency is contingent upon having had adequate prior clinical experience and exemplary performance in the didactic phase of the program. Applications for the degree program are reviewed and approved beginning in September for admission in September of the following year. Applicants who require early notification should indicate this in a cover letter accompanying the application forms.

For more information write to Mr. Daryl Bichel, Occupational Health Program, HSPH, 665 Huntington Avenue, Boston MA 02115, or call 617/432-3314.

Occupational Safety and Health The master's program in occupational safety and health emphasizes the epidemiologic and biostatistical aspects of occupational safety and health. This is generally a two-year degree program, although an individual with a PhD or JD may complete the program in one year. It is anticipated that persons without a doctoral degree will subsequently enroll in a doctoral program.

Background of Applicants Applicants normally have a bachelor's degree and advanced training in science. Applicants currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission. College-level organic and inorganic chemistry courses are required for admission.

For more information about this program and financial support which may be available for United States citizens or permanent residents through traineeships or National Research Service Awards, write to Dr. Richard R. Monson, Occupational Health Program, HSPH, 665 Huntington Avenue, Boston MA 02115, or call 617/432-3325.

Respiratory Biology
Joseph D. Brain, Cecil K. and Philip Drinker Professor of Environmental Physiology and Director of the Respiratory Biology Program

This program offers doctoral training in preparation for research careers in respiratory biology. Its foundation is a public health viewpoint of the respiratory system. We are interested in the normal and pathological biology of the respiratory system, and its role as a portal of entry and a target for environmental agents. We focus on such aspects as respiratory mechanics, respiratory neurophysiology, airway pharmacology, and respiratory defense mechanisms, especially macrophage biology. The program also emphasizes inhalation toxicology and the pathology of environmental and occupational lung disease. The biology is broadly based, ranging from molecular and cell biology to integrated organismic, environmental, and comparative physiology; both normal and pathological physiology are included.

Intensive course work in the first two years may include physiology, biochemistry, cell and molecular biology, experimental pathology, engineering, toxicology, statistics, and immunology. The latter part of the program consists of research under the guidance of a faculty advisor. Collaborative research opportunities exist in several area institutions. Special facilities are available including three electron microscopes and a flow cytometer, as well as techniques developed by the program (e.g., magnetometric measurements of motion ranging in scale from the entire chest wall to subcellular components, computer modeling of chest wall mechanics, and laser stereology).

Background of Applicants Candidates normally have a bachelor's degree in biology or the physical sciences. Candidates also frequently include veterinarians and physicians. Applicants generally apply for a doctoral degree; master's degree programs are not ordinarily offered.

For More Information write to Dr. Joseph Brain, Respiratory Biology Program, HSPH, 665 Huntington Avenue, Boston, MA 02115, or call 617/432-1272.

Department of Epidemiology

Dimitrios V. Trichopoulos, Henry Pickering Walcott Professor of Epidemiology and Chair of the Department

Faculty Professors L. Goldman, Li, Mann, Monson, Mueller, Robins, Tsuang, Walker, and Willett; Associate Professors Brinkmann, Cook, Hsieh, Maclure, and Stampfer; Assistant Professors Colditz, Freeman, M. Goldman, Hunter, Krolewski, Spiegelman, Tohen, and Zahner; Lecturer Murphy

Adjunct Faculty Professors Adami, Paffenbarger, and Rothman

Epidemiology is the study of the frequency and distribution of disease and its determinants. The Department of Epidemiology offers training in the application of epidemiologic methods to the investigation of diseases of unknown cause and provides training in the field of clinical epidemiology to interested students. Areas of emphasis include malignant neoplasms, cardiovascular disorders, infectious diseases, abnormalities of reproduction and development, and mental disorders.

Current Departmental Research

- Role of viruses in the etiology of cancer
- Relationship of diet and risk of cancer, cardiovascular disease, and other major chronic diseases
- Relationship between exposure to chemicals in the workplace and the development of cancer
- Relationship of hormonal patterns and breast cancer
- Factors in youth predisposing to chronic diseases
- Case identification and risk factors in mental disorders
- Health effects of oral contraceptives and post-menopausal hormones
- Relationship between thyroid disease treatment and breast cancer
- Etiology of non-Hodgkin's lymphoma, with emphasis on immune system disturbances
- Pharmacoepidemiology
- Causes of human infertility

Degree Programs
Master of Science in Epidemiology, Doctor of Science, Doctor of Public Health; for MPH degree, please refer to Master of Public Health Program on page 14.

Programs and Concentrations
Infectious Diseases
Clinical Epidemiology
Psychiatric Epidemiology

Concentration in Infectious Diseases The study of the epidemiology of infectious diseases requires familiarity with general epidemiology and biostatistics. Because it involves vectors of infectious agents in the case of many diseases, a good understanding of vector biology is also required. Infectious diseases occur frequently in warm climate countries with less developed infrastructures. Therefore, the study of infectious disease epidemiology requires a solid understanding of social and cultural aspects of disease. For these reasons, a student of infectious disease epidemiology has to take courses not only in the Department of Epidemiology but also in other departments. Introductory courses are TPH 201a and TPH 202b. ID 223cd teaches the epidemiologic methods for developing countries. EPI 214d deals with nosocomial and other outbreaks of infectious disease. EPI 224c and POP-EPI 225c treat the epidemiology of AIDS. ID 201cd focuses on malaria. More advanced topics of infectious disease epidemiology are covered in tutorials with faculty specializing in this area (Brinkmann, Freeman, Hunter, Mann, Mueller) in a seminar series on the analysis of complex systems (POP 355cd), and in courses covering mathematical modeling of disease transmission and biomathematics.

Concentration in Clinical Epidemiology This program, leading to a Masters of Science degree, is designed primarily for clinicians and other health care professionals who wish to develop the research skills that are used in the area of clinical epidemiology to examine a number of issues, including assessing test performance, measuring hard and soft outcomes, estimating prognosis, evaluating therapies, and developing clinical prediction rules. Students take a core set of courses, which addresses the options for study design and the basic analytic approaches to these types of clinical problems. In addition, these courses are supplemented by a variety of related courses offered in the Department of Epidemiology and in other departments at the school.

Concentration in Psychiatric Epidemiology This program is designed to provide training in the epidemiology of mental disorders at both the master's and doctoral levels. The students are introduced to concepts and methods for studying both genetic and psychosocial factors that relate to the prevalence, incidence, and outcome of different types of psychiatric illnesses. Emphasis is given to issues of reliability and validity in studying such disorders among children, adolescents, and adults. The curriculum consists of four specialized courses as well as related courses offered in the Department of Epidemiology and in the Department of Biostatistics.

Background of Applicants The master's programs provide students with basic skills in epidemiologic and quantitative methods and in computing, in preparation for research or professional careers.The one-year training program for a degree is open to applicants with a medical degree or equivalent biological background. It includes most of the courses offered by the department, plus courses in principles of biostatistics, statistical methods in research, and computing principles and methods. Additional courses in areas of special interest and/or supervised research comprise the remainder of the program.

The two-year program is designed for persons who hold a bachelor's degree and have a strong background in biology and mathematics. In addition to epidemiology and statistics courses, students take courses in basic medical sciences and the biological aspects of public health problems. The program is mainly intended for students who will continue toward a doctorate.

The doctoral programs are designed for students who plan careers in research or teaching epidemiology or who aspire to leadership roles in the health professions. Unless course work equivalent to that described for the master's degree has been taken previously, most of the first two years is occupied with courses. Subsequently, doctoral candidates complete a thesis and gain experience in teaching and research.

The department considers applications for direct admission to the Doctor of Science (SD) program from candidates holding bachelor's degrees with strong backgrounds in biology and mathematics. For these individuals, the SD generally takes four to five years to complete; candidates with relevant doctoral degrees may complete the program in three years.

Career Outlook The career outlook for epidemiologists is good. Some positions taken by recent graduates include those of officers in the Epidemic Intelligence Service, Centers for Disease Control; epidemiologists at the National Cancer Institute; and appointments at universities and medical schools.

For More Information write to Ms. MaryAnne Zani, Department of Epidemiology, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1055.

Department of Health Policy and Management

Robert J. Blendon, Roger Irving Lee Professor of Health Policy and Management and Chair of the Department

Faculty Professors Brennan, Fineberg, Frazier, Graham, Hedley-Whyte, Herzlinger, Hsiao, Levine, Newhouse, Roberts, Tarlov, and Weinstein; Associate Professors Dorwart, Epstein, Mulley, and Reich; Assistant Professors Calkins, Cotton, Kane, Latimer, Makadon, Mollica, Siegel, and Tosteson; Visiting Assistant Professor Johannesson; Senior Lecturer Hemenway; Lecturers Antczak-Bouckoms, Barrett, Braun, Campbell, P. Feldman, Kasten, Palmer, and Prothrow-Stith

Adjunct Faculty Professors Field, Greenfield, Pliskin, and Shepard; Associate Professor Gostin; Assistant Professor Kaplan; Lecturers Chalmers, Glaser, Kerr, Moriarty, Moseley, Moulton, Nobel, Norris, Siegrist, and Wasek

The Department of Health Policy and Management is a mission-oriented department concerned with improving the health care delivery system and mitigating public health risks in the United States and abroad. The department is dedicated to resolving major management and health policy problems through original research, advanced training, and dispute resolution. Research priorities are organized in six broad areas: health financing and insurance; management of health hazards; management of health care organizations; management and evaluation of medical technology; business and labor in health; and international health. The department's problem-solving orientation is exemplified by its strong ties with leading health practitioners in hospitals, HMOs, community health centers, health advocacy groups, corporate medical departments, health and environmental consulting firms, state and local health departments, legislative committees, federal regulatory agencies, and international agencies. Practical problem-solving skills are emphasized by an interdisciplinary faculty that includes management specialists, decision analysts, accountants, physicians, lawyers, policy analysts, economists, political scientists, and program evaluators.

Current Departmental Research

- *Health Financing and Insurance* Designing new systems for payment of physicians; predicting the responses of hospitals and physicians to reforms in the hospital reimbursement system; estimating the costs and benefits of increasing Medicaid coverage for the uninsured poor; designing public policies to cope with medical malpractice, litigation, and rising insurance premiums

- *Management of Health Hazards* Comparing the effectiveness of alternative AIDS prevention policies (e.g., premarital screening, contact tracing); using risk assessment to set priorities for environmental health protection; quantifying the health benefits of exercise; devising new approaches to enhancing highway safety; designing clinical and policy strategies to protect the health of underserved populations

- *Management of Health Care Organizations* Applying concepts of corporate strategic planning to the challenges faced by leaders of America's major health systems and pharmaceutical firms; measuring and enhancing the quality of medical care; using survey methods to track long-term trends in public confidence in physicians, hospitals, and other health care professionals; analyzing financial health of healthcare organizations.

- *Medical Technology* Developing new analytic tools for technology assessment; performing meta-analyses of data from clinical trials; estimating cost-effectiveness of new technologies for treatment of coronary heart disease

- *Business and Labor in Health* Comparing responses of business and labor to the AIDS epidemic; negotiating occupational health and safety as well as health care benefits in the collective bargaining process

- *International Health* Evaluating the cost-effectiveness of health programs in developing countries; analyzing means of financing health services; examining strategies to improve health conditions in developing countries; analyzing development policies and health impacts

- *Quality of Health Care* Designing better methods for measuring quality of health care and demonstrations of how quality measurements can help providers to improve their performance, including a quality review system to fulfill the congressional mandate to extend quality monitoring into physicians' offices, and a qual-

ity review system for senior managers and clinicians in health care plans to monitor quality of performance of clinical management systems

- *Health Care Reform Project* Developing partnerships between the department and the corporate community to explore critical aspects of health policy and management; clarifying the underlying forces driving the national debate on health care reform; and developing solutions that acknowledge the pluralism inherent in our society

Degree Programs

Master of Science in Health Policy and Management; Doctor of Philosophy in Health Policy (awarded by the Harvard University Graduate School of Arts and Sciences); for the MPH degree, please refer to the Master of Public Health Program on page14.

Master of Science in Health Policy and Management (Two-Year Program) The two-year master's program is designed for students who are building professional careers in health-related fields and who aspire to leadership roles in either the public or private sector. The key elements of the program are: an emphasis on professional skills and concepts, a solid grounding in the substance of health problems, rigorous quantitative training, and a curriculum which combines professional, academic, and clinical activities. The program is based on the premise that training in an academic setting should be enriched by experience in problem-solving situations and work in a health setting. The curriculum is applied to practical situations through a required summer internship program and an applied field research program.

All students in the two-year program take courses in epidemiology, statistics, and economics. In addition, students are required to satisfy the requirements of at least one of five available concentrations.

Background of Applicants The program seeks candidates from a wide variety of undergraduate fields whose work experience and academic record, particularly in quantitative and analytic courses, suggest outstanding potential in the areas of health policy and management. Applicants whose preparation appears deficient in some area, such as quantitative methods, may be offered provisional acceptance contingent upon the successful completion of specific course work in advance of matriculation.

Candidates are expected to have at least two years of pertinent post-baccalaureate work experience in the health field but exceptions are occasionally made for outstanding applicants. Deferred admission is available for some applicants who demonstrate strong potential in the field but who lack sufficient professional experience in the health sector. Students offered deferred admission work within the health field in a position approved by the program for a minimum of one year before matriculating.

Programs and Concentrations

Health Financing and Insurance
Management of Health Hazards
Management of Health Care Organizations
International Health
Health Research and Analysis

Health Financing and Insurance This concentration is for students who are planning careers in the private or public sector where analytical skills in economics, accounting, and finance are critical to management or policy decisions. The required courses include financial analysis and control, health care regulation and planning, health care finance, and reimbursement systems. Examples of recommended electives include economics of the health sector, cost-benefit analysis of health programs, the role of government in the health care system, and business and labor in the health system.

Management of Health Hazards This concentration is for students who wish to become involved in the formulation of disease and injury prevention policies for corporations, labor unions, public interest groups, public sector agencies, or legislative committees. Students are required to take courses in economics, statistics, epidemiology and management. The menu of recommended electives permits students to acquire additional skills in areas such as epidemiology and quantitative policy analysis and to develop specialties in specific health problems such as AIDS, environmental pollution, and injuries.

Management of Health Care Organizations This concentration is for students pursuing management careers in either public or private sector health care institutions. The required courses include financial analysis and control, marketing, management information systems, decision analysis, and strategic planning. Recommended electives address topics such as cost-benefit/cost-effectiveness analysis, quality assurance, risk management, and physician performance.

International Health This concentration is for students with prior international experience and relevant foreign language skills who are interested in management or policy careers in developing countries or in organizations that work extensively abroad. Required courses provide an overview of health economics, management, and

policy analysis. Recommended electives address infectious disease control, demography, and political economy. This concentration is linked to the broader international health programs in the school.

Health Research and Analysis This concentration is for students looking toward doctoral education and research careers in areas such as health economics, quality of care, technology assessment, health decision analysis, cost-effectiveness analysis, cost-benefit analysis, and advanced statistical analysis. Recommended electives address topics such as survey research, epidemiologic research, economic analysis, financial analysis, and quality assessment.

Students select one of these concentrations at the beginning of their first year of study in consultation with their faculty advisor. In keeping with the program's flexibility, second-year students are encouraged to enroll in courses relevant to their concentrations at the Graduate School of Business Administration, the John F. Kennedy School of Government, and the Graduate School of Education.

Master of Science in Health Policy and Management (Nine-Month Program) The nine-month master's program in Health Policy and Management is designed primarily for physicians (and other candidates with relevant advanced degrees) who are research-oriented and desire an intensive exposure to analytic and quantitative skills. The degree is appropriate for students interested in either domestic or international research questions. Graduating MPH students who have research interests or desire more advanced coursework are encouraged to remain for a second year and earn the two-year SM degree in Health Policy and Management.

The required courses include biostatistics, epidemiology, economic analysis, and management. The menu of recommended electives includes upper-level courses in biostatistics, epidemiology, health economics, health decision sciences, quality assurance, technology assessment, and program evaluation. Students also complete a research tutorial under the supervision of a member of the department.

Background of Applicants Candidates for the nine-month SM program in Health Policy and Management generally hold graduate professional degrees and have significant experience in health services. Typical applicants to the program are professionals in medical or health-related disciplines who expect to devote a substantial portion of their careers to research.

The program is also designed to satisfy similar needs of health professionals who do not necessarily hold an advanced degree, but who have eight to ten years' work experience in the health services area with a high degree of responsibility, and who wish to acquire management and research skills relevant to their career interests.

All applicants must demonstrate through prior academic performance, work experience, and standardized test scores the ability to master the quantitative and analytic content of the program.

Doctor of Philosophy in Health Policy The Department of Health Policy and Management participates in a joint Ph.D. program offered in the Faculty of Arts and Sciences in conjunction with the Medical School's Division of Health Policy Research and Education and other graduate faculties. Application materials and further information on this program may be obtained from Joan Curhan, Director, Harvard Ph.D. Program in Health Policy, John F. Kennedy School of Government, 79 John F. Kennedy Street, Cambridge, MA 02138 or call 617/496-5412 (FAX 617/496-9053).

Career Outlook The department has developed an effective job placement mechanism which includes numerous contacts with potential employers on a national and international scale, a process which begins in the first year. A system of faculty networking and professional contacts is used to link students with a broad range of health policy makers and executives. Practitioners are invited to the department to discuss their work and career paths.

Some positions taken by recent graduates include financial manager for a health maintenance organization, administrative director of a primary care center, environmental policy officer for a manufacturing firm, policy analyst for a legislative committee, consultant for an international health organization, products manager for a major corporation, and assistant director of a community health center.

Post-graduate job opportunities in the United States are extremely limited for international students studying under a student visa. Foreign students should not, therefore, anticipate working in the United States following completion of their degree program.

For More Information Write to Ms. Carla Mortensen, Deputy Director, Academic Programs, Department of Health Policy and Management, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1090.

Department of Health and Social Behavior

Diana Chapman Walsh, Florence Sprague Norman and Laura Smart Norman Professor of Public Health and Chair of the Department

Faculty Professors Levine and Pierce; Associate Professors Cleary and Sorensen; Senior Lecturer Gortmaker; Assistant Professor Daltroy; Lecturer Wechsler

Adjunct Faculty Lecturers Benfari, DeJong, and Rudd

The Department of Health and Social Behavior trains public health professionals and researchers to apply social and behavioral sciences theory and methodology to issues in health and illness and to design, implement, and systematically evaluate programs to support health. Teaching and research focus on individual, social, and institutional pressures influencing a variety of behaviors (exercise and diet, intentional and unintentional injury, sexual behavior, the use of health care services, the use of alcohol, tobacco, and other drugs), on populations at high risk for preventable mortality and disability, on stages and decisive factors in processes of personal and organizational change, and on the design and testing of alternative change strategies and applications in a range of social settings (including mass media, families, neighborhoods, clinics, community organizations, schools, colleges, and places of work).

Current Departmental Research

- Specification and analysis of major social determinants of health
- Design, development, and evaluation of community-based and mass media programs to promote health and prevent drug/alcohol abuse, drunk driving, interpersonal violence, and AIDS/STDs
- Studies of obesity, physical activity, diet, and television viewing
- Cancer prevention in the workplace, intervention research in community and occupational settings.
- Social and policy dimensions of attempts to control the use of alcohol, cigarettes, and other drugs
- Epidemiology of alcohol and drug use among adolescents and young adults, in secondary schools, colleges, workplaces
- Design and evaluation of educational programs for people with chronic disease, especially musculoskeletal conditions such as low back pain and arthritis
- Evaluation of interventions to reduce risk of HIV transmission and improve quality of life of HIV-infected persons
- Design, development, and evaluation of intervention programs, protocols, and methods for lifestyle alteration
- Improvement of communication between doctors and patients
- Evaluation of effectiveness of child health services on minority populations and those in poverty
- Statistical evaluation methods used in the behavioral sciences and in health promotion interventions
- The quality of life as an outcome of health care

Degree Programs Master of Science in Health and Social Behavior, Doctor of Science, and Doctor of Public Health; for the MPH degree, please turn to page 14.

Master's candidates do course work in areas of health and behavior, health promotion and education, behavioral aspects of health services, behavioral risks to health and social marketing and social influences on health. Doctoral candidates develop expertise in the application of behavioral science approaches and methods to selected public health problems. Examples of recent student research include risks of teenage childbearing; smoking, alcohol and drug use among college students; dietary tyrosine, stress, and coping with chronic illness, including HIV infection; school health education; and childhood obesity and physical activity.

Background of Applicants Applicants with a bachelor's degree in a related behavioral sciences discipline are generally eligible for the two-year master's program. Applicants with a master's or a doctoral degree may complete the Master of Science degree in one year or in some cases are admitted directly into the doctoral program.

Career Outlook Positions taken by recent graduates have included university faculty positions at public health and medical schools, directing research and evaluation for a pregnancy prevention program, evaluating city and state health departments, designing educational curricula and programs, and designing and managing health promotion activities at HMOs and major corporations.

For More Information write to Dr. Rima Rudd, Director of Educational Programs, Department of Health and Social Behavior, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1135.

Department of Maternal and Child Health

Marie C. McCormick, Professor and Chair of the Department

Faculty Professor Earls; Associate Professors Crocker and Sachs; Assistant Professors Lieberman, Peterson, and Wise; Lecturers Deykin and Gardner

Adjunct Faculty Professors Dwyer and Reiss

The goal of the Department of Maternal and Child Health is to improve the health status of mothers and children through basic and applied research, and through involvement in advocacy and community service.

The academic curriculum includes courses on maternal and child health problems of public health significance, the physical, social, and cognitive stages of human development; MCH health services; the role of governmental, private, and voluntary health agencies; relevant research methods; and the methodology of program planning, policy formation, and program evaluation in maternal and child health.

All concentrators in MCH are expected to acquire an understanding of normative growth and development, definition and research in maternal and child health problems, maternal and child health services, the legislation which supports health and social services for mothers and children, and the planning of such services.

Current Departmental Research

Infant Mortality and Morbidity: Risk factors for fetal, neonatal and post-neonatal mortality; methods for confidential perinatal inquiry; outcomes of high-risk infants such as low birth weight infants; efficacy of early intervention; variations in NICU practice; and evaluation of perinatal interventions.

Normative Growth and Development: Patterns of growth, maturation, and behavioral, social, and nutritional changes in an aging cohort; the relationship between adult health and child health and development; statistical methodology for analyzing processes of growth and development.

Special Needs Children: Survey and assessment of Massachusetts health services providing care for children with chronic illness or disability; development of standards of care for children with special health care needs; criteria for assessing proposals to reform the financing of health care.

High-risk Youth: Longitudinal studies on the risk factors for delinquency and violent behavior; statistical issues in the use of accelerated longitudinal designs; measurement of biological, psychosocial, and community-level variables in studies of delinquency and violence; characteristics of adolescent suicide completers; co-morbidity among chemically dependent adolescents; manifestation of depression in older adolescents; policies and strategies for preventing high-risk adolescent behaviors; services for children and youth with HIV.

Nutrition: Epidemiology of child undernutrition in the United States and developing countries; computerized screening of pregnant women at nutritional risk; HIV and breast-feeding.

MCH Services: Planning and performance of federal, state and local public health agencies; case studies of planning, policy development, and performance of State Title V agencies.

Degree Programs

Master of Science in Maternal and Child Health, Doctor of Science, Doctor of Public Health, for the Master of Public Health degree, refer to the Master of Public Health Program on page 14.

Master of Science The master's program is designed for students who wish to focus, in-depth, on maternal and child health. The department offers both a one-year and a two-year program, depending on the background of the student. Candidates for the one-year SM must fulfill at least 20 credit units in departmental offerings, and candidates for the two-year SM, at least 30 credit units. Occasionally, courses offered in other areas of Harvard University may be substituted to meet this requirement.

Dual Master's Degree Program A two-year/two-degree program is available for eligible nurses to study half-time for a Master of Science in Maternal and Child Health and half-time for a Master of Science in the Primary Care Program in Parent-Child Nursing of Simmons College. The curriculum prepares nurses for leadership roles in community-oriented primary care for parents and children. Nurses interested in the two-year/two-degree program must apply to, and be accepted by, both the Harvard School of Public Health and Simmons College.

For More Information write to Dr. Jane Gardner in the Department of Maternal and Child Health, or Dr. Maria Bueche, Simmons College, 300 The Fenway, Boston, MA 02115.

Doctor of Science/Doctor of Public Health Doctoral candidates must spend at least two years in residence completing course work leading to a major in MCH and a minor in two other fields. Successful completion of the departmental exam and of the school's doctoral qualifying exam permits the student to undertake independent research culminating in a written dissertation.

Background of Applicants Applicants eligible for the one-year SM program are established practitioners or investigators holding prior masters' or doctoral degrees in a related field such as medicine, dentistry, nursing, social work, nutrition, physical therapy, psychology, health education, or anthropology.

Applicants eligible for the two-year SM program have either a master's degree in a field unrelated to health (such as law, education, sociology, or statistics) or a bachelor's degree in a health-related field and exceptional, relevant work experience.

Applicants to the two-year/two-degree program hold a bachelor's degree from a program accredited by the National League for Nursing, a license to practice nursing, and the equivalent of at least three years of full-time nursing experience in maternal and child health. International nurses with equivalent backgrounds are also eligible to apply. Applicants must meet the general admissions requirements of both the Harvard School of Public Health and Simmons College.

Applicants to the doctoral programs must have an advanced degree in a health field related to maternal and child health. Applicants are expected to have a sound academic record with documented proficiency in the quantitative sciences, relevant experience, and research interest in an area consonant with the goals of the department.

Career Outlook Graduates of the master's program generally obtain positions in local, state, national, or international health agencies. Some positions taken by recent graduates include planner for the Indo-Chinese refugees' health programs for Rhode Island, director of maternal and child health for New Mexico, director of maternal and child health for the Emirate of Qatar, and nutrition consultant for the United States Public Health Service regional office.

Students completing the doctoral program usually assume academic posts in graduate schools of public health, nursing, social work, and related disciplines. Others assume positions of responsibility in national and international organizations and foundations.

Fellowships A limited number of tuition fellowships may be available to master's degree candidates who are United States citizens concentrating in the Department of Maternal and Child Health.

For More Information write to Dr. Marie C. McCormick, Department of Maternal and Child Health, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call, 617/432-1080.

Department of Molecular and Cellular Toxicology

Armen H. Tashjian, Jr., Professor of Toxicology and Chair of the Department

Faculty Professor Demple; Associate Professor Samson; Assistant Professors Call, Schiestl and Schlegel

Adjunct Faculty Associate Professor Marquis; Assistant Professor Farr; Lecturer Ofner

Toxicology is the study of the injurious effects of chemicals. The scope of modern toxicology is broad and depends on the integration of knowledge and techniques from the medical, biological, chemical, and physical sciences. The faculty and staff of the department reflect this multidisciplinary aspect of toxicology.

Current Areas of Research

- Receptor-mediated toxicity
- Tumor promotion
- Biochemical and genetic responses to oxidative stress
- Molecular and genetic toxicology
- Second messenger signalling systems
- Molecular biology of DNA repair and mutagenesis in prokaryotes and eukaryotes
- Development and use of animal and human cell culture models
- Regulation of early mitotic events in mammalian cells

- Genetic recombination and predictive carcinogenesis
- Molecular mechanisms of genetic instability in cancer and aging

Degree Programs
Doctor of Science, granted by the Harvard School of Public Health; Doctor of Philosophy, granted by the Division of Medical Sciences of the Graduate School of Arts and Sciences. The degree granted is determined by route of entry.

The research and training program in toxicology provides students with knowledge of the health implications of environmental chemicals, interactions of toxic agents with cellular systems, biochemical mechanisms of toxicity, identification of toxic environmental chemicals, and prevention or reversal of adverse effects where possible.

The first year is usually devoted to course work. Students take courses at the Harvard School of Public Health, the Division of Medical Sciences, and other Harvard graduate programs. Appropriate courses may also be taken at MIT. Students are expected to pass a qualifying examination before the end of the fourth semester and complete thesis research within four to five years of residence.

First-year students have the opportunity to broaden their research skills by rotations in at least three different laboratories for ten weeks each. The laboratory rotation experience is supervised by each laboratory head and enables students to become familiar with a variety of research problems and techniques. At the end of each rotation, students prepare a brief written report and give an oral presentation.

Students participate in journal clubs and weekly laboratory research meetings. Students who are well-advanced in their thesis research are encouraged to present their research at appropriate national scientific meetings.

Fellowships A limited number of tuition fellowships and graduate stipends are available for both U.S. citizens and international students.

Background of Applicants Candidates should have a bachelor's degree and demonstrated knowledge of organic, physical, and biological chemistry, general biology, physics, and calculus. A personal interview is strongly encouraged.

Career Outlook Some positions taken by recent graduates include postdoctoral research fellowships at academic institutions, junior faculty positions, and staff positions at federal agencies or industrial laboratories.

For More Information detailing the program and faculty interests, write to Ms. Kathy Silva, Department of Molecular and Cellular Toxicology, 665 Huntington Avenue, Boston, MA 02115, or call 617/432-2286.

Department of Nutrition

Walter C. Willett, Fredrick John Stare Professor of Epidemiology and Nutrition and Chair of the Department

Faculty Professors Antoniades, P. Goldman and Haber; Associate Professors Storch and Sul; Assistant Professors Frei, Peterson, Sacks, and Wessling-Resnick; Lecturers Herrera-Acena, Reinhold, and Witschi

The Department of Nutrition provides training and research opportunities in basic science relating to nutrition and epidemiologic aspects of nutrition as they affect public health. Nutrition policy and the evaluation of nutritional interventions are long-standing interests of the department, particularly as they concern issues in Latin America, Africa, Asia, and the United States. Interests of the department range from molecular biology to human studies of cancer and heart disease. Students learn and use the latest techniques, whether in biochemistry, physiology, biostatistics, or epidemiology, and related fields. Research, whether basic or applied, is relevant to human health.

Current Departmental Research

- Large prospective studies of dietary factors in relation to heart disease and cancer
- Development of methods to assess nutritional status by an analysis of body tissues
- Use of computers for interactive dietary analysis and counseling
- Regulation of cell growth by polypeptide growth factors and the mechanisms of such regulation
- Regulation of cellular metabolism by insulin and nutrients
- Regulation of membrane lipid transport and intracellular lipid transport
- Use of state-of-the-art mass spectrometry to study the structure of complex carbohydrates and glycoproteins
- Effects of nutrition programs and methodology on the mental and physical consequences of malnutrition

- The role of oxidants and antioxidants in the pathogenesis of arteriosclerosis
- Regulation of the intracellular delivery of macromolecular nutrients

Degree Program Doctor of Science

Areas of Concentration
Nutritional Biochemistry
Epidemiology/International Nutrition

Nutritional Biochemistry The doctoral program in nutritional biochemistry trains highly qualified individuals interested in laboratory-oriented approaches to solving nutritional and metabolic problems.

Degree Requirements Students are required to take graduate courses in biochemistry, physiology, epidemiology, and biostatistics. Students must also take formal course work in two minor fields, one of which must be biochemistry and the other chosen from the other basic medical sciences. Laboratory research is begun at the end of the first year, following rotations in several faculty laboratories.

Epidemiology/International Nutrition Students undertake a doctoral program in the Department of Nutrition with a heavy emphasis on course work and experience in biostatistics and epidemiology. This program furnishes thorough training in all of these disciplines, enabling graduates to apply sound epidemiological methods to an ever-increasing number of nutritional problems. Students may elect to have a joint degree in Epidemiology.

Degree Requirements Students are required to take formal course work in two minor fields, one of which must be epidemiology. Students in a joint program with Epidemiology must satisfy the course requirements in both departments and must select a minor field acceptable to both departments. The thesis will concern a topic in both nutrition and epidemiology.

Background of Applicants Students with a bachelor's or master's degree may apply for admission to the Doctor of Science (SD) degree program in nutritional biochemistry. An excellent background in chemistry, biology, nutrition, or some other relevant scientific discipline is necessary for admission.

Admission to the program in nutritional epidemiology requires a strong background in biology and mathematics. Admission to a joint program with Epidemiology requires approval of both the Department of Nutrition and the Department of Epidemiology. Applicants to the joint SD program or the Doctor of Public Health program should contact the Department of Nutrition before making formal application.

Career Outlook Some positions taken by recent graduates of the Department of Nutrition include assistant professor of biochemistry at a university, assistant professors and research associates at schools of medicine and schools of public health, postdoctoral research fellows in medical centers and universities, nutrition research director at a major food company, nutritionist at a school of public health, director of nutrition support service in a medical center, community nutritionist for a state health project, local health clinic administrator, food analytical chemist for an industrial firm, nutritionist for a federal nutrition evaluation agency, and nutrition educator for a Tunisian institute.

For More Information write to the Office of the Chair, Department of Nutrition, HSPH, 665 Huntington Avenue, Boston, Massachusetts 02115, or call 617/432-1333.

Department of Population and International Health

Lincoln C. Chen, Taro Takemi Professor of International Health and Chair of the Department

Faculty Professors Alonso, Dyck, J. Harrington, Hill, Levins, Lucas, Mann, and Salhanick; Visiting Professor Sen; Associate Professors Berman, Brinkmann, Garenne, Heggenhougen, and Reich; Assistant Professors Murray, Obermeyer, and Snow; Lecturers Aitken, Berggren, Cash, J. Walsh, and Wyshak

Adjunct Faculty Professors Caldwell and Hareven; Associate Professor Das Gupta

Faculty affiliated with the Department of Population and International Health are specialists in various disciplines associated with the population field: anthropology, demography, ecology, economics, epidemiology, ethics, nutrition, politics, reproductive biology, and sociology. The department's degree programs prepare students to participate actively in population programs as administrators, researchers, and educators. Course work includes basic and intermediate demography, and as linkages to other disciplines. Students develop skills in data analysis and information management and evaluation while acquiring a broad perspective on problems and policies in the population field, especially in relation to population dynamics in developing countries.

The Department offers four Areas of Concentration (see details following), and coordinates the International Health concentration of the MPH Program. As a result of the Department's extensive involvement in population and international health issues in developing countries, overseas health issues are given prominence in many of the courses offered. Although the problems in developed countries are also considered, the student with career plans in international health will be particularly welcome in the Department.

Degree Programs

Master of Science in Population and International Health, (2 year program) Doctor of Science, Doctor of Public Health, for the Master of Public Health degree, please refer to the Master of Public Health Program on page 14.

Areas of Concentration

Demography
Reproductive Health
International Health Policy and Economics
International Health Epidemiology and Ecology

Demography The concentration in demography is designed for students interested in population-based approaches to the study of health and fertility. Students are expected to develop strong technical and substantive skills in demography. These skills include the theory and application of demographic analysis, the social dynamics of fertility and mortality change, and aspects of public policy and interventions. The concentration involves a broad exposure to demographic change within the context of economic development, urbanization, social change, population policies, health interventions, and ethical issues. Areas of special interest in the department are microdemography (demography and anthropology), linkages between demography and biology, longitudinal community-based research approaches to population and health problems, and monitoring and assessment of intervention programs.

Reproductive Health The core curriculum in this concentration provides the student with knowledge of the physiologic basis of reproduction, the global and regional prevalence of major reproductive health problems, and the determinants and consequences of these problems, including policy and intervention perspectives.

The research direction in reproductive health stresses a combination of laboratory, field-based, and social policy analyses of reproductive health issues. Topics of interest are physiologic adaptations of the human reproductive system to nutrition, physical work, infections, and environmental constraints; the physiology of anovulation; demographic analysis of reproductive risk factors; the relationship between steroid metabolism and reproductive cancer; biologic and social bases of side-effects associated with contraception; women's reproductive health and feminist population policy; and policy analysis and intervention strategies in reproductive health.

International Health Policy and Economics The concentration in international health policy and economics is designed to develop skills and pursue research on health policies and health economics of developing countries, including institutional and political analysis, international relations, health financing strategies, project planning and evaluation, and comparative studies. Topics of interest in the department include environment and development, pharmaceutical policy, health and development policy, public and private sector health policies, and household production of health. A project in this area is the Harvard-Hinduja Program in Community Health, which involves the Harvard School of Public Health in collaboration with the Hinduja National Hospital in Bombay in the development of innovative approaches to the organization and delivery of urban health care.

International Health Epidemiology and Ecology International health epidemiology applies and develops the methods of general epidemiology for the planning, implementation, monitoring, and evaluation of health programs in diverse settings in the developing world. Because disease patterns in developing countries are often dominated by infection, parasitic infestations, and malnutrition, the program emphasizes control and prevention measures against these health problems. The human, organizational, and personal infrastructure for health action in many developing countries are severely constrained, and thus international health epidemiology focuses especially in theoretical and practical epidemiologic approaches to solving health problems under resource-constrained circumstances.

Particularly close interdisciplinary collaboration has been developed with epidemiology, human ecology, and molecular biology. These disciplines have different histories, institutional arrangements, and areas of concern. They, however, overlap broadly in the study of infectious and vector borne diseases, health problems associated with contamination and socioeconomic development, and the health ecology of the workplace. They share the population and ecosystem as research domains and the need to develop and apply statistical and other mathematical methods for the analysis of complex phenomena.

The international health epidemiology program is aimed at graduate students interested in developing advanced epidemiological capabilities as applied to international health problems. In addition to the Department of Population and International Health, the program taps the support available in the Departments of Epidemiology, Biostatistics, and Tropical Public Health. It encourages students to combine epidemiological methods with other disciplinary skills, such as demography, anthropology, economics, health policy and the laboratory sciences.

The program encourages specialization in specific areas of epidemiology. The participants should acquire basic knowledge and skills in general epidemiology, biostatistics, public health, infectious diseases and parasitology. The core courses teach epidemiological field methods for developing countries (ID223cd, Brinkmann and Maguire), aspects of a global epidemic, AIDS (PIH 242c, Mann), the epidemiological analysis of outbreaks of infectious disease (EPI 214d, Freeman and Platt), and human ecology (PIH 256d, Levins). Complimentary sources in allied fields are recommended. They include health policy and management, environmental health, nutrition, and anthropology in other units of the School and University.

Background of Applicants Students in the department come from a variety of backgrounds. Most students have had advanced training in the biological or social sciences or extensive experience in applied fields relevant to population sciences, although some students may have only bachelor's level training in these fields. Many students are from developing countries, and all have an interest in the health of disadvantaged populations worldwide.

Students with bachelor's degrees in biological sciences, social sciences, or other population-related fields generally spend two years in residence toward the master's degree. Admission to the doctoral program is usually preceded by the completion of the SM degree, although candidates with exceptional preparation may be admitted directly to the program.

Career Outlook Some positions taken by recent graduates include head of the directorates of population and epidemiology in ministries of health; consultant on family planning and service delivery in women's health for United Nations' organizations; consultant to the Population Council; consultant to the World Bank; director of population organizations.

For More Information Please turn to the section beginning on page 39 on the department's associated International Health Programs and the Center for Population and Development Studies. For further information about the department, write to the Education Office, Department of Population and International Health, HSPH, 665 Huntington Avenue, Boston, MA 02115, or call, 617/432-2253.

Department of Tropical Public Health

John R. David, Richard Pearson Strong Professor of Tropical Public Health and Chair of the Department

Faculty Professors Piessens, Spielman, and Wirth; Associate Professors Brinkmann, Harn, Maguire, and Titus; Visiting Associate Professor Mendis; Assistant Professors Barker, Samuelson, and Shoemaker; Lecturer Cash

Adjunct Faculty Professor Monath, Associate Professor Caulfield, and Assistant Professor Peattie

Parasitic diseases are a major health problem in the developing world, particularly in tropical regions. In the Department of Tropical Public Health, research and teaching focus on the biological and ecological aspects of protozoan and helminthic diseases, as well as tuberculosis and Lyme disease. The department offers opportunities for basic study of the biology of parasitism and practical work aimed at development of better tools for diagnosis, vaccines, and control. The program accepts students at the master's, doctoral, and postdoctoral levels.

The program takes a multidisciplinary approach to infectious diseases, using immunology, molecular biology, medical entomology, cell biology and ultrastructure, biochemistry, pathology, and epidemiology. It includes research within the school and field collaborations overseas in Brazil, Venezuela, Colombia, Mexico, Kenya, Sri Lanka, Egypt, Thailand, India, China, and Indonesia.

Current Departmental Research

- Immunology of schistosomiasis, leishmaniasis, filariasis, onchocerciasis, and tuberculosis
- Molecular biology of malaria, schistosomiasis, amoebiasis, giardiasis, tuberculosis and Lyme disease
- Development of DNA probes to detect infections
- Epidemiology and control of malaria, schistosomiasis and leishmaniasis

- Public health entomology, and ecology of Lyme disease
- Biochemistry, immunology, and pharmacology of insect saliva

Degree Programs
Master of Science, Doctor of Science; for the Master of Public Health degree, please refer to the Master of Public Health Program on page 14.

Areas of Concentration
Tropical Public Health
Immunology and Molecular Biology of Parasitic and Other Infections
Vector Biology, Ecology, and Control
Infectious Disease Epidemiology and International Health

Tropical Public Health The basic courses (TPH 201a and TPH 202b) provide students with a comprehensive understanding of the major parasitic and other infectious diseases, emphasizing epidemiology and control. Other courses deal with various aspects of parasitism, particularly the biology, immunology, molecular biology, vector biology, cell biology, and pathology associated with parasites and their vectors. Although ecological, epidemiological, political, and social aspects relevant to control of infectious agents are integrated into the teaching programs, the focus of the department's research remains primarily in the biological aspects of the host-parasite relationship. Many TPH courses are also integrated into the International Health MPH program.

The program, which leads to the Master of Science (SM) degree, provides students trained in the health sciences with the background necessary to promote research or service careers in developing countries. It introduces them to the significance, recognition, and prevention of the major infectious disease problems of developing countries. Students satisfy basic course requirements in biostatistics, epidemiology, and tropical public health.

The participants take courses in epidemiology, biostatistics, public health, and parasitic and other infectious diseases. This includes courses in epidemiological field methods for developing countries, aspects of a global epidemic, AIDS, malaria, and human ecology. The program runs in collaboration with the departments of Population and International Health and Epidemiology.

Immunology and Molecular Biology of Parasitic and Other Infections This program introduces students to recent advances in the area of the biology of parasitic and infectious diseases and provides background for conducting research on these diseases. Emphasis is placed on molecular biology, immunology, and cell biology. In this concentration, the Master of Science (SM) degree is usually regarded as preparation for the Doctor of Science (SD) program.

Students satisfy basic course requirements in tropical public health, biostatistics, and epidemiology and take advanced courses in this department as well as at the Medical School and at the Graduate School of Arts and Sciences. Students are expected to enroll in tutorials or to carry out laboratory research projects in addition to their formal course work. The research program emphasizes molecular biology, immunology, cell biology, and the epidemiology of parasites.

Vector Biology, Ecology, and Control This program introduces students to the various arthropod vectors of human infection and develops an appreciation for the biology of these organisms and the means for their control. It prepares students to plan and evaluate control programs and develops skills with respect to identification, maintenance, and experimental procedures involving these organisms.

Majors in Tropical Public Health are required to take TPH 201a and at least one of the following: TPH 208cd or TPH 216cd. In addition to required courses in epidemiology and biostatistics, participants in the program take courses in vector biology, molecular biology, immunology, and parasitology. Depending upon the particular interest of each student, courses in cell biology, invertebrate physiology, pathology, genetics, population ecology, and computer sciences may be required. The research program emphasizes experimental ecology, biochemistry, physiology, and molecular genetics.

Infectious Disease Epidemiology and International Health This program applies and develops the methods of general epidemiology to infectious disease and for the planning, implementation, monitoring, and evaluation of health programs in diverse settings in the developing world. The program emphasizes control and prevention measures and theoretical and practical epidemiologic approaches to solving health problems under resource-constrained circumstances.

Doctoral degree applicants for all concentrations will be processed through the Division of Biological Sciences.

Admission Requirements Students in all four programs have at least a bachelor's degree, but can enter at any level of advanced training, including the postdoctoral level. Applicants with a doctoral degree in medicine, dentistry, veterinary medicine, biology, behavioral sciences, other natural and social sciences, law, economics, and engineering, are also considered for admission. Applications to the programs must be received by the school before the February 1 deadline for admission to the Department of Tropical Public Health.

Career Outlook Recent graduates have taken research faculty positions in universities and in industry, and administrative posts in programs dealing with the control of tropical, parasitic, and vector-borne diseases. Positions are in the public and private sectors and at the national and international levels.

For More Information write to Ms. Kate Eckhaus, Department of Tropical Public Health, HSPH, 665 Huntington Avenue, Boston, MA 02115, or call, 617/432-1201.

Division of Biological Sciences

Edgar Haber, M.D., Elkan R. Blout Professor of Biological Sciences and Director, Division of Biological Sciences

Faculty

Department of Cancer Biology Antoniades, Boothby, Essex, Glimcher, Grusby, Haseltine, Hirsch, Kanki, Kelsey, Lee, Liber, Little, and Nickoloff

Department of Environmental Health Brain, Butler, Christiani, Dockery, Drazen, Ford, Fredberg, J. Harrington, Hu, Kelsey, Kobzik, Koutrakis, Milton, Monson, Paulauskis, Robins, Rudnick, P.B. Ryan, Shea, Sherwood, Shore, Speizer, Spengler, Valberg, Warner, and Yanagisawa

Department of Epidemiology Brinkmann, Hunter, Maclure, Stampfer, and Walker

Department of Molecular and Cellular Toxicology Call, Demple, Ofner, Samson, Schiestl, Schlegel, and Tashjian

Department of Nutrition Antoniades, Frei, P. Goldman, Reinhold, Storch, Sul, Wessling-Resnick, Willett, and Witschi

Department of Population and International Health Brinkmann, Garenne, Levins, Obermeyer, Salhanick, and Snow

Department of Tropical Public Health Barker, Brinkmann, Cash, Caulfield, David, Harn, Maguire, Piessens, Samuelson, Shoemaker, Spielman, Titus, and Wirth

The goal of the Division of Biological Sciences in Public Health is to strengthen the scientific basis of biological knowledge and methodology applied to major issues of public health. To accomplish this, the division brings together faculty members and training programs from departments with strong biological components, including Cancer Biology, Environmental Health, Molecular and Cellular Toxicology, Nutrition, and Tropical Public Health. Affiliated faculty members of the Departments of Biostatistics, Epidemiology, and Population and International Health also share the division's goals.

Program The Division's goal is to attract to the School outstanding students for graduate study in an interdisciplinary program of biomedical and public health sciences. Students come from a variety of backgrounds but with the common interest of applying their talents to real world problems. This interdisciplinary aspect of the program represents a major attraction for outstanding students. Each student's program consists of establishing a firm foundation in basic biomedical sciences, epidemiology and biostatistics in addition to specific courses which focus on the student's research interest. Students are required to do three laboratory rotations, in three different research areas both to aid them in deciding on a doctoral research topic and to provide them with interdisciplinary training. Students are admitted to the Division as candidates for a Doctor of Science degree.

Degree Requirements During the first year, students have two important components to their formal training, course work and laboratory rotations. A core of required courses providing a firm foundation in biomedical sciences and quantitative analysis has been developed for the Division. Students choose an area of concentration and then complete the required curriculum in that area of concentration. The basic courses in biochemistry, cell biology, genetics and immunology are common for all of the areas of concentration, with specialization occurring primarily during the second year of training in which the student takes advanced courses in his/her area of concentration.

All students take a biostatistics course which has been developed especially for this program emphasizing quantitative approaches to laboratory sciences, as well as a basic epidemiology course in which the general principles and methods of epidemiology are introduced.

Students are required to take ordinal coursework which is divided into courses required, and recommended elective courses. All students must demonstrate expertise in the required areas (biochemistry, cell biology, genetics, immunology, biostatistics, and epidemiology) either by the successful completion of the required course or by the demonstration of equivalent knowledge, usually from another course taken previously. In addition, students take laboratory rotations and required seminar courses.

All the applications to the Division of Biological Sciences are reviewed in a three stage process. The first review is by the Division committee comprised of representatives from each department. Then applications are directed to individual departmental committees responsible for the selection of candidates for their programs which are to be recommended for admission. Finally, these recommendations are reviewed by the School of Public Health's Committee on Admissions and Degrees. Official written notification to selected candidates is from the Admissions Office at the School of Public Health.

Background of Applicants Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Applicants deficient in one of these areas may be admitted provisionally on the basis that appropriate courses are taken before and/or after entry. Three letters of evaluation are required from instructors of science and mathematics, and applicants who have worked in relevant areas should also supply evaluation letters from employers. Applicants wishing to visit the school are encouraged to come for an interview.

Applications for this program should be received by and will not be reviewed until the January 15th deadline.

The division provides eligible students with two years of financial support (full tuition plus stipend). Thereafter, the student is supported by the department or laboratory in which the thesis work is conducted.

Career Outlook The biological sciences have a very positive career outlook. There will be increasing numbers of tenure-track academic positions becoming available in the 1990s. In addition, there is a large demand from biotechnology companies and pharmaceutical organizations for people with divisional training.

For More Information write to Ms. Ruth Kenworthy, Division of Biological Sciences, HSPH, SPH2 219, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-4089.

International Health Programs

The International Health Programs seek to promote international health research and education throughout the Harvard School of Public Health. Collaborating academic units include the Departments of Population and International Health, Tropical Public Health, Nutrition, Epidemiology, Maternal and Child Health, and Health Policy and Management. Faculty members who participate in the International Health Programs are drawn from these departments and from various schools throughout the university, giving international health an interdisciplinary orientation. The faculty members have had experience in Latin America, the Caribbean, Africa, Asia and the Middle East.

Dr. Adetokunbo O. Lucas, Professor of International Health. In this capacity, Dr. Lucas has major responsibility for the international health concentration of the Master of Public Health degree program, including curriculum review and student admissions criteria. The courses offered in this concentration are described in the section on the Master of Public Health program. Support for these activities is provided by the Education Office which also provides services for the Department of Population and International Health. Some programs that are especially linked to the Department of Population and International Health are cited on the following pages.

Takemi Program in International Health

Michael R. Reich, Associate Professor of International Health and Director of the Takemi Program in International Health

The Takemi Program in International Health offers fellowships for research and advanced training on critical issues of international health, especially those related to developing countries. The program addresses problems of mobilizing, allocating and managing scarce resources to improve health, and of designing solid strategies for disease control and health promotion. Through its fellowships, the program aims to contribute to institutional development and improvement of national policy in the individual's home country, and to the advancement of general knowledge. The program is named for Dr. Taro Takemi, the distinguished physician-scientist who served for more than 25 years as president of the Japan Medical Association.

The primary goals of research under the Takemi Program are to investigate how resources are allocated for health purposes in both rich and poor countries and to develop methods for making such choices more rational and equitable. The program also strives to promote cooperative research and comparative analysis of health policies and programs in different countries, and to study transnational causes of ill health, such as population migration and disease transmission, and air and water pollution. Currently, the program's research focuses on a few of the world's most urgent health needs, particularly those of the developing countries, and the most effective ways to meet them. Areas of research have a strong practical emphasis and include the assessment of health technology; the structure, organization, and financing of health care; and the relationships among rapid population growth, increasing pressures on the environment, and health status. In all areas of research, the program emphasizes the social and cultural factors that shape a country's efforts to improve health.

Each Takemi Fellow carries out a specific research project, using data they bring with them. The projects are closely linked to action programs and to the work Takemi Fellows will do after returning home. Program findings and results are disseminated widely, and opportunities are sought to apply them in various settings.

Fellows also participate in the weekly Takemi Seminar. These seminars examine the question of how to set priorities under conditions of limited resources and evolving technology. The program sponsors several open lectures each year to discuss important issues in international health, to explore possible research themes for the program, and to educate Harvard students and faculty on the state of knowledge and research in international health.

The Takemi Program is not degree-oriented, since course requirements would substantially reduce the time available for research and writing. Upon completion of the program, Takemi Fellows receive a certificate. Takemi Fellowships are generally awarded for ten months. The program offers several fellowships on topics related to maternal and women's health and development in s ub-Saharan African countries, through a grant from the Carnegie Corporation of New York. Other Takemi Fellows are supported by external funds raised by each Fellow in cooperation with the program staff.

Background of Applicants Takemi Fellows are highly qualified young and mid-career professionals and scholars from around the world with prior training and experience in public health, medicine, economics, administration, biological science, and other fields.

International AIDS Center

Jonathan M. Mann, Professor of Epidemiology and International Health and Director of the International AIDS Center

International cooperation is an integral part of the mission of the Harvard AIDS Institute. The Institute's International AIDS Center was created to mobilize resources for multidisciplinary research on AIDS in developing countries and to strengthen exchanges between AIDS investigators at Harvard and in developing countries.

Priority areas for International AIDS Center work include AIDS and human rights; the role of community-based, non-governmental organizations; women and AIDS; detection and evaluation of innovations in HIV/AIDS prevention; examination of interactions between HIV/AIDS programs, STD programs and primary health care programs; the political economy of the manufacture, distribution and availability of diagnostic tests, therapeutic drugs and vaccines; and new pandemic recognition and response.

The Global AIDS Policy Coalition
In 1991, the International AIDS Center was chosen to house the secretariat of the Global AIDS Policy Coalition, an international research and advocacy group which brings together scientists, activists, clinicians people with HIV, and community service providers. The Coalition identifies and tracks trends in the global HIV/AIDS pandemic, provides independent evaluation and policy analysis, promotes independent evaluation and policy analysis, promotes international information exchange in order to strengthen existing HIV/AIDS programs, and publishes an annual report entitled "AIDS in the World." Research activities are currently being organized by the Coalition in all of the International AIDS Center's priority areas as noted above, and in such areas as the impact of structural adjustment on AIDS programs in developing countries. Coalition activities are supported by the Francois Xavier Bagnoud Association.

The AIDS and Reproductive Health Network
The Center also serves as the support base for a multidisciplinary international scientific network on AIDS and reproductive health. The AIDS and Reproductive Health Network, provides stable, long-term scientific and training opportunities for members' research teams from developing countries in Africa, Asia and Latin America, and as promotes the exchange of information on AIDS research and prevention. Members of the network pursue their own research while also learning from the experiences of others working on similar problems in different settings. Epidemiological and social science research, health education, and other interventions are emphasized in research projects already developed and funded in Mexico, Brazil, Senegal, Nigeria, Zaire, Uganda, Kenya, Ethiopia and Thailand.

Harvard Center for Population and Development Studies

Lincoln C. Chen, Taro Takemi Professor of International Health and Director of the Harvard Center for Population and Development Studies

The Harvard Center for Population and Development Studies was established in Cambridge, in 1964, under the leadership of the Harvard School of Public Health as a university-wide center for the study of world population problems. The members and research associates of the center are drawn from the departments of Biology, Economics, Government, Sociology, and the Division of Applied Sciences in the Graduate School of Arts and Sciences; from the faculties of Public Health, Design, Divinity, Education, Government, and Medicine; and from the Massachusetts Institute of Technology.

Population and Health Transition Program Begun in early 1987, the Population and Health Transition Program is a multi-faculty, interdisciplinary program with the goal of reviewing and ultimately strengthening social science contributions to health improvement in developing countries. The program's objectives are to review the rapid transitions that are under way in mortality, morbidity, and fertility in developing countries, to examine the relationship of these health and population changes to major social, economic, and cultural transformations in developing societies, and to encourage interdisciplinary dialogue among social scientists, health scientists, and public health experts on the means of improving health.

The program involves a core group of ten Harvard faculty members. The 1990-1992 biennium will be devoted to health and developmental change in South Asia and sub-Saharan Africa. The program is supported by grant funds from the Rockefeller Foundation.

Population, Resources and Environment Program Due in part to the encouragement of the founding director of the center, the late Professor Roger Revelle, a research and educational program was initiated in 1990 to study

the critical interaction between population, resources, and the environment (PREP). A series of biweekly research seminars engage a wide range of speakers from Harvard and beyond to present issues in the field. Early activities examined the impact of population growth, income, and technological change on regional and worldwide pollution due to carbon dioxide, nitrogen, and lead. The study used empirical data to examine pollution trends in specific countries over the past 50 years, with particular attention to the policy context of these developments. In 1991-92, the PREP seminar series will seek to explore the effects of natural resource access and sustainability (land and water) on women's livelihood and reproductive decision-making.

The PREP Program is open to interested Harvard faculty and students. It is research-oriented; support for initial activities has been provided by a grant from the MacArthur Foundation.

MacArthur Population Leadership Program
The MacArthur Population Leadership Program was launched in 1990 with the objective of nurturing young leaders from both developing countries and the United States. The purpose of the program is to identify, select, and support the development of young people who may play major leadership roles in the population field in the future. The program is based on the premise that future population issues will require competencies and engagement beyond demography, contraceptive development, and family planning. While competencies in these three core areas of population are critical, it is vital that future leaders should be equipped to participate in and to introduce population dimensions to other fields, including human rights, natural resources and the environment, health and well-being.

Food and Nutrition Program The International Food and Nutrition Program coordinates a series of global programs under the sponsorship of the United Nations University, Tokyo, and edits the quarterly Food and Nutrition Bulletin. The program includes studies of the functional consequences of iron deficiency in five developing countries and the use of anthropological methodologies for the evaluation of nutrition and primary health care in more than twenty countries. Nevin S. Scrimshaw, Institute Professor Emeritus, MIT, directs this activity.

Research focuses on how environmental factors such as level of nutrition and energy outputs (e.g., physical activity, lactation) affect female reproductive ability and reproductive health. An ongoing collaborative project, funded by NIH, examines changes in body fat, quantified by Magnetic Resonance Imaging, in relation to hormonal and metabolic indices in athletes compared to non-athletes. Other projects include the relation of reproductive factors to the risk of cutaneous melanoma; the risk of bone fractures in relation to the consumption of non-alcoholic carbonated beverages; and the continued analysis of the reproductive health data of 5,398 alumnae (former athletes compared to controls) of the Long-Term Health of American Women Study. Findings already published include a lower lifetime occurrence of breast cancer and reproductive system cancers among the former college athletes compared to the controls.

Development Issues in South Asia: Current Research
"Development Issues in South Asia: Current Research" is a multi-disciplinary seminar sponsored by the center at which selected scholars present their current research on development issues in one or more countries of South Asia. Topics have included "Indian Planning: Lessonsand Non-Lessons" and "Macro-Economic Constraints to Economic Growth in India with Comparative Observations."

Harvard Institute for International Development

Richard A. Cash, Institute Fellow and Lecturer (HSPH), and Uwe K. Brinkmann, Associate Professor (HSPH), Institutional Liaisons

Located in Cambridge, Massachusetts, the Harvard Institute for International Development (HIID) provides technical assistance to developing countries on programs, strategies, and policies that promote health and development. Many of the staff of the HIID Health Office hold joint appointments at HIID and the School of Public Health. These faculty undertake research and teaching related to public health issues. Students may find opportunities to collaborate on HIID activities in Cambridge during the school year through the work-study program. Other students may gain field experience through participation in overseas projects.

Postdoctoral • Special Programs

Some departments, particularly Biostatistics and some laboratory-oriented departments such as Cancer Biology and Environmental Health, offer opportunities for postdoctoral research and training. Research fellows generally work with principal investigators on continuing research projects and may also serve as teaching assistants. Research fellows may be salaried, offered a stipend, or required to supply their own funding from public or private sources. For more information about postdoctoral opportunities, please contact the administrator or chair of the relevant department.

Interdisciplinary Programs in Health

Postdoctoral Program
John S. Evans, Associate Professor of Environmental Science and Director of Interdisciplinary Programs in Health

The Program in Environmental Health and Public Policy was launched, in 1977, as part of the Interdisciplinary Programs in Health. Its primary objective is to enlist scholars from the natural and social sciences in finding new ways to deal with the critical environmental problems of today's society. It aims to bring to environmental problems the knowledge, skills, insights, and analytic techniques of a variety of disciplines. Based at the School of Public Health, it is a university-wide program in which members of the faculties of Arts and Sciences, Government, Law, Medicine, and Business participate. It is not a degree-granting program.

The program focuses on the scientific and analytic foundations of environmental decisions. Its aim is to provide a core around which to focus the talents and energies of individuals and groups within the Harvard community on the problems of environmental health and public policy. The central environmental dilemma facing a modern society is that the process of growth and change unavoidably introduces environmental hazards and benefits. These hazards must be identified, characterized, and evaluated; their relation to the social, economic, and health goals of the society must be analyzed. Decisions must be made and laws and regulations written to mitigate environmental hazards as far as possible while encouraging the development of the society.

Postdoctoral fellowships are awarded for terms of one year and are renewable for a second year. Fellows devote their initial period to orientation, exploration of opportunities, and selection of projects and advisors. Experimental facilities are available in the laboratories of existing research groups. It is expected that during the term of a fellowship, a substantial investigation or analysis will be completed.

Background of Applicants Fellows are promising graduates of advanced degree programs who seek preparation for careers in which their talents can be applied to environmental health-related problems, either through fundamental or applied research or through service. Fellows are chosen from the natural sciences (chemistry, biology, biochemistry, physics, and mathematics), the quantitative analytic areas (statistics, operations research, engineering, computer science, etc.), and the social sciences (economics, sociology, public policy, law, management, etc.).

Visiting Scientists and Scholars Visitors may be on leave from universities, industry, or public-interest organizations. Applicants should submit a curriculum vitae, a list of publications, a proposal for research or study to be undertaken in IPH, and a statement of the relation of IPH to their career objectives. Stipends may be available, depending on individual circumstances and the availability of other support to the applicant.

Background of Applicants Visitors fall into two general categories: Senior scientists and scholars who have made significant contributions in a discipline and now wish to apply their discipline to environmental health-related problems; and individuals from government, industry, or public-interest organizations who have been involved in problems of environmental health and regulation and wish to broaden their background and perspective.

Minority Postdoctoral Fellowship Program

Postdoctoral Program
Cassandra A. Simmons, Assistant Dean for Students and Admissions and Director of the Minority Postdoctoral Fellowship Program

The Minority Postdoctoral Fellowship program, launched during the 1990-91 academic year, provides a bridge between academic training in public health disciplines and entry-level faculty positions for members of underrepresented minority groups. The program gives participating fellows the opportunity for substantial development as scholars and as independent researchers, and provides a competitive stipend.

The school recognizes that mentoring is a crucial component in the evolution of scholars to academicians. Accordingly, each fellow works closely with a mentor, an

experienced faculty member in his or her area of interest, who can foster and guide research development by providing critical review of research findings and manuscripts, by extending the opportunity to present scientific work at national meetings, and by providing contacts with colleagues within the university and at other institutions. Mentors help develop fellows' teaching abilities by providing the opportunity to lecture in courses and guidance in curriculum development and pedagogic methods. Finally, mentors serve as resources for the development of grant proposals and the promotion of funding activities. Optimally, fellows complete the program in two years (although appointments may be extended to three), having established an independent research agenda, having published papers in peer-reviewed journals, having obtained independent grant support, and having gained sufficient teaching experience to develop their own courses. Fellows also participate in a variety of other activities designed to involve them fully in the formal and informal life of the academic community.

Background of Applicants Candidates for this program are American citizens or permanent residents of one of the minority groups (Black, Hispanic, and Native American) considered to be underrepresented in the faculty ranks. All applicants must hold an earned doctoral degree. Since the Harvard School of Public Health is multidisciplinary, candidates with a variety of appropriate specialties are encouraged to apply. Applicants must have a background and career goals which are relevant to one of the programs or departments within the school.

For More Information call Dr. Cassandra A. Simmons, Director of the Minority Postdoctoral Fellowship Program, at 617/432-1036.

Fellowships in Health Services Research

Postdoctoral Program
Milton C. Weinstein, Henry J. Kaiser Professor of Health Policy and Management and Director of the Program in Health Services Research

Postdoctoral Fellowships in Health Services Research are available to physicians and dentists who wish to develop the skills necessary to become independent researchers. Areas of interest include quality of medical care; technology assessment and cost-effectiveness; health care policy (financing, physician payment, manpower, access to care); management of health care organizations; and AIDS policy.

The program emphasizes methodology in evaluation research, decision science, economics, and organizational analysis, and permits fellows to design an individualized program that combines coursework, tutorials under the supervision of Harvard faculty, and research experience. Fellows may also elect to apply for admission to a formal degree program at the master's or doctoral level. The fellowship term is ordinarily two years, and pays an annual stipend based on the number of years of relevant experience after completing the MD or equivalent degree. Funds are also available to cover tuition and research-related expenses.

Background of Applicants Candidates for the fellowship must hold an MD, DDS, or equivalent degree, and must be a U.S. citizen or permanent resident. The application consists of a curriculum vitae, three letters of reference, and a two-page statement describing career goals, research interests, and reasons for applying. The deadline for application falls in October of each year.

For more information write Ms. Carla Mortensen, Deputy Director, Academic Programs, Department of Health Policy and Management, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 or call 617/432-1090.

Training Program in Psychiatric Epidemiology and Biostatistics

Doctoral and postdoctoral program
Ming T. Tsuang, Professor of Epidemiology and Psychiatry and Program Director, and Nan M. Laird, Department Chair and Henry Pickering Walcott Professor of Biostatistics and Program Co-Director.

The program provides doctoral and postdoctoral training in epidemiologic and statistical methods as applied to the study of psychiatric disorders. A limited number of fellowships funded by the National Institute of Mental Health (NIMH) are available that cover tuition expenses and pay an annual stipend commensurate with prior education and related experience. The program is jointly administered by the Departments of Epidemiology and Biostatistics.

Psychiatric Epidemiology Concentration Training is provided in both population-based and clinical epidemiologic investigations of the etiology of psychiatric disorders. The primary emphasis is on the study of the origins, course, and outcomes of psychiatric disorders. Students

may also receive specialized training in the areas of psychiatric genetic epidemiology, developmental psychiatric epidemiology, psychosocial epidemiology, clinical psychiatric epidemiology, and pharmacoepidemiology.

Psychiatric Biostatistics Concentration Training is provided in probability theory and applications, statistical inference, regression analysis, analysis of variance, log-linear models and multivariate analysis of quantitative data. Students are encouraged to take courses of particular importance for psychiatric investigations, e.g. survival analysis, clinical trials, longitudinal data analysis, and to complete a minor in psychiatric epidemiology. Students participate in relevant working seminars and are required to engage in a summer internship under the supervision of faculty in psychiatric epidemiology and biostatistics.

Background of Candidates and Degree Options NIMH training fellowships may only be awarded to U.S. citizens or permanent residents. Trainees typically hold degrees in medicine, biological or social sciences, or quantitative methods. Prior research experience is also recommended. Candidates may apply for SM, SD, DPH degrees either in Epidemiology or Biostatistics; only postdoctoral candidates are eligible for the SM degree in this program. Degree candidates must fulfill general requirements of the department of their proposed concentration (ie., Epidemiology or Biostatistics) and must complete substantive course work in psychiatric epidemiology. Non-degree postdoctoral fellowships are also available, offering supervised research opportunities in ongoing, faculty-sponsored projects.

Application procedures Applicants to degree programs must be accepted by the HSPH Committee on Admissions and Degrees before they can be considered for an NIMH training fellowship. All degree program applicants should indicate their interest in the Training Program in Psychiatric Epidemiology and Biostatistics in the Statement of Objectives and Plans of the HSPH application form. Individuals interested non-degree postdoctoral fellowships should send a letter describing current research interests, together with a curriculum vitae, three letters of recommendation, and one or more representative publications to Ms. Mary Anne Zani at the address listed below.

For further information contact: Ms. Mary Anne Zani, Harvard Training Program in Psychiatric Epidemiology and Biostatistics, Kresge (9th Floor), Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1055; FAX: 617/566-7805.

Postdoctoral Training Fellowships in Biostatistics

Postdoctoral Programs
Marcello Pagano, Professor of Biostatistics (Director of AIDS Program), Louise Ryan, Associate Professor of Biostatistics (Director of Environmental Health Program), and Marvin Zelen, Professor of Statistical Science (Director of Cancer Program)

The Department of Biostatistics has Postdoctoral Fellowships available for Biostatistical Training in the areas of AIDS, Cancer and Environmental Health.

Background of Applicants Applicants must have a doctoral degree in biostatistics, statistics or a related discipline and an interest in the development and application of statistical methods for biomedical research. Postdoctoral appointments are funded through a variety of research and training grants, including training grants from the National Institutes of Health oriented to research on cancer, the environment, and AIDS. Recipients of NIH traineeships must be either U.S. citizens or permanent residents of the United States.

Postdoctoral Quantitative Training in HIV Related Diseases This program is joint with the Department of Epidemiology. It is aimed at postdoctoral students who are interested in biostatistical and epidemiological research directed against the AIDS epidemic. It concentrates on training in the study of the mechanisms for transmission of the virus and the planning and analysis of AIDS clinical trials.

Collaborations with units at Children's Hospital, Brigham and Women's Hospital, Beth Israel Hospital, and Boston City Hospital provide access to data on drugs and HIV infection in mothers and infants. Additional opportunities for collaborations come through epidemiological studies in New York City, Italy, Mexico, Greece and Japan, as well as the Department of Biostatistics' statistical and data coordinating center for hospital based AIDS clinical trials. Among the methodological research areas under current investigation are: techniques associated with censored survival models, planning and analysis of AIDS clinical trials, models for predicting the future course of the AIDS epidemic, computer models to assess the impact of interventions to prevent or slow down the incidence of AIDS (e.g. clean needle programs), and modification of existing methods when data is collected at irregular intervals. Applicants for this program may also hold a doctorate in epidemiology.

Postdoctoral Training in Environmental Biostatistics This program is designed for postdoctoral students who wish to pursue statistical and environmental research addressing effects of the environment on human health. Fellows will participate in at least one interdisciplinary environmental research project. Current research areas at the School include environmental epidemiology, exposure assessment, developmental toxicity, occupational health, carcinogenesis, and risk assessment. Faculty in the department work with the School's Kresge Center for Environmental Health which enables fellows to be involved in emerging research activities. Fellows will also participate in ongoing statistical research addressing environmental problems and will be encouraged to develop independent research programs. Relevant areas of current methodologic research in the Department include measurement error models, longitudinal studies, statistical methods for developmental studies, analysis of correlated binary data, analysis of spatially distributed observations, Bayesian methods, and meta-analysis.

Postdoctoral Training in Cancer Biostatistics Postdoctoral fellows supported by the cancer biostatistics training grant are geographically located within the Department of Biostatistics, Epidemiology and Dana-Farber Cancer Institute. The Division carries out a broad program in interdisciplinary collaborations with clinical and basic scientists, as well as research on statistical methodology. There is special emphasis on multi-center clinical trials. The close interaction with cancer research serves to generate many new theoretical problems in statistics. Among the areas of current methodological research are: survival distributions (counting processes, modeling, regression methods with partially missing data, surrogate markers), bioassay, models for carcinogenesis, models describing the quality of life from clinical trials, theory of repeated measures, group sequential methods, planning of studies with misclassification errors, and optimal scheduling of diagnostic examinations.

Program in Human Ecology

Special Doctoral Program
Richard Levins, John Rock Professor of Population Sciences and Head of the Program in Human Ecology

The study of human ecology in a public health context integrates social, historical, and ecological aspects of human existence in order to understand and influence the improvement of health in populations and communities. The Program in Human Ecology is an interdepartmental research and teaching program including faculty from the Department of Population Sciences and other areas. The program emphasizes the inseparability of biological and social components and the patterns of health and disease, agriculture, environmental protection, and resource use within a framework of complex system analysis.

Degree candidates usually take further training in quantitative and qualitative mathematical approaches to complex systems, general and human ecology, and demography. Advanced courses relevant to each student's research interests are available as electives. These might include agricultural systems and production, population ecology, ecological anthropology, specialized courses in tropical public health, environmental sciences, and biology.

Background of Applicants Applicants are accepted into a doctoral program in one of the school's departments and must meet that department's admission and degree requirements and those of the Program in Human Ecology. Potential applicants should contact Dr. Levins to indicate their interest in being considered for the program.

Public Health for Dentists

Special Master's Program
Chester W. Douglass, Lecturer on Public Health Dentistry and Head of the Department of Dental Care Administration, Harvard School of Dental Medicine

Dentists enroll in many of the degree programs at the Harvard School of Public Health, particularly in the Master of Public Health program. The school cooperates with the Harvard School of Dental Medicine to offer a three-year postdoctoral fellowship program which leads to a public health degree and dental specialty certificate, as described below:

Postdoctoral Fellowship Program in Dental Public Health, Epidemiology, and Dental Care Administration This program prepares individuals for creative full-time teaching, research, and administrative careers in dental public health, epidemiology, and dental care administration. Participants in the program are appointed as Clinical or Research Fellows in Dental Care Administration at the School of Dental Medicine.

The program comprises three parts of approximately one year each. One part of the program involves a formal course of study leading to a Master of Science or Master of Public Health degree. Fellows must complete the core courses in the first year at the Harvard School of Public Health and must complete all requirements for the degree within two academic years. Candidates with an equivalent degree from another school, however, may be accepted into the program with one year advanced standing.

The second portion of the program involves a one-year supervised residency at the community, state, or national level in epidemiology or health policy and administration. This residency meets the requirements of the American Board of Dental Public Health. The third portion affords opportunity for advanced study and research at the Harvard Schools of Dental Medicine and Public Health, at other Harvard schools, and at other institutions. Fellows may carry on epidemiological or health services research over the entire three-year period in a variety of situations involving either new or continued studies. Each participant in the program prepares a research thesis for presentation at the end of the third year.

In addition to the master's degree, candidates receive a certificate of completion of residency requirements from the Harvard School of Dental Medicine. Several doctoral programs are available for fourth- and fifth-year fellows.

Background of Applicants The Postdoctoral Fellowship Program is open to dentists and other qualified health professionals who meet the admission requirements of both participating schools. Application should be made to the School of Dental Medicine, whose Committee on Postdoctoral Education will forward the applicant's file to the School of Public Health for consideration.

Program in Clinical Effectiveness

Special Master's Program Affiliated with the Brigham and Women's Hospital
Research Training Program in Clinical Effectiveness
Howard H. Hiatt, Professor of Medicine and Director of the Program in Clinical Effectiveness, and Lee Goldman, Professor of Medicine

The Program in Clinical Effectiveness is intended for physicians who have completed their residencies and wish to prepare themselves for careers in clinical research. The degree requirements include an intensive summer session of didactic training in biostatistics, epidemiology, decision sciences, and health economics. This is followed by research in the clinical department to which they have previously been accepted, together with graduate work that leads to a Master of Public Health or Master of Science degree. Most participants in the program spread their academic and clinical work over two years.

Applications should be made to Dr. Hiatt or Dr. Goldman, Department of Medicine, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115. The final application deadline for Clinical Effectiveness applicants only will be April 30, 1993.

Epidemiology Research Traineeship

Traineeship Program
Julie Buring, Associate Professor of Preventive Medicine, and Charles Hennekens, Professor of Medicine and Preventive Medicine, Co-Directors of the Epidemiology Research Traineeship Program

This program aims to prepare individuals for research and teaching careers in epidemiology, with particular emphasis on cardiovascular disease or aging. Formal course work is supplemented with seminars and tutorials, and with field activities under the supervision of a preceptor. Opportunities for field activities include design, conduct, and analysis of case-control and cohort studies, randomized clinical trials, and community surveys.

Background of Applicants Candidates must be United States citizens or permanent residents who are enrolled in a degree program in epidemiology at the Harvard School of Public Health. Members of minority groups are particularly encouraged to apply.

For More Information write to Dr. Buring or Dr. Hennekens at 55 Pond Avenue, Brookline, MA 02146, or call 617/732-4965.

Cancer Epidemiology Research Traineeship

Traineeship Program
Nancy Mueller, Professor of Epidemiology, Director of Cancer Epidemiology Research Fellowship Program

The purpose of this program is to prepare individuals for research and teaching careers in epidemiology with emphasis on cancer. Students follow the curriculum in epidemiology with additional coursework in the epidemiology and biology of cancer. Students who are completing a doctoral degree are expected to focus their research on cancer under the guidance of a faculty member participating in the program.

Background of Applicants Candidates must be United States citizens or permanent residents who are enrolled in a degree program in epidemiology at the Harvard School of Public Health. Priority is given to doctoral degree candidates. Members of minority groups are especially encouraged to apply.

For More Information write to Dr. Mueller at the Department of Epidemiology, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-4576.

Institutes • Centers • Offices

Harvard AIDS Institute

Myron E. Essex, Mary Woodard Lasker Professor of Health Sciences and Chair of the Harvard AIDS Institute

The Harvard AIDS Institute was founded to organize and expand on the already strong foundation of AIDS research at Harvard University. The institute is dedicated to increasing the amount of AIDS research at Harvard across all disciplines and in the various Harvard schools and affiliated institutions. A major goal is the enhancement of collaborative, interdisciplinary work.

To promote collaboration and communication among the many AIDS researchers at Harvard, the institute organizes forums, seminars, and conferences and produces a variety of publications providing important updates on research developments and AIDS research funding opportunities. It also sponsors a training grant to bring scientists from developing countries to study AIDS research techniques at Harvard.

Center for Health Communication

Jay A. Winsten, Associate Dean for Public and Community Affairs and Director of the Center for Health Communication

A key challenge facing health professionals is to mobilize the immense power of mass communication to empower individuals to adopt healthy behaviors, direct policy makers' attention to important but neglected health issues, and frame those issues for public debate and resolution.

To address this challenge, the Center for Health Communication is developing a new field of endeavor in academic public health, namely, mass communication and health.

This is accomplished by:

- Conducting and publishing research and analysis documenting the contributions of mass communica tion to behavior change and policy
- Designing and implementing graduate course work, in collaboration with the academic departments, to prepare future health leaders to utilize effective com munication strategies
- Creating programs to strengthen communication and understanding between journalists and health professionals

The best known of the Center's efforts is the Harvard Alcohol Project, which has demonstrated how a new social concept — the designated driver — can be rapidly introduced through mass communication, catalyzing a fundamental shift in social norms. The Harvard Domestic Violence Prevention Project seeks to deepen public understanding of domestic violence and contribute to the implementation of policies to prevent it.

The Center sponsors the Harvard Journalism Fellowship for Advanced Studies in Public Health, which provides opportunities for journalists to examine critical issues in public health through a combination of structured, problem-oriented seminars and self-directed study.

The Center sponsors the Harvard Nutrition and Fitness Project, which acts as a nationwide resource for journalists concerned with family health and diet, and sponsors a working luncheon series in New York City for magazine writers and editors.

The Center's Advisory Board is chaired by former United States Surgeon General Julius Richmond, now Professor of Health Policy, Emeritus, Harvard School of Public Health. Other members of the Advisory Board are John Chancellor, NBC News senior commentator; Milton Gossett, co-chairman, Saatchi and Saatchi Advertising Worldwide, Inc.; Howard H. Hiatt, Professor of Medicine, Harvard Medical School; Richard Menschel, managing partner, Goldman Sachs & Co.; David Perlman, associate editor, San Francisco Chronicle and board member of the Council for the Advancement of Science Writing; Irene Pollin, president, Linda Pollin Foundation; Arnold Relman, Editor-in-chief, Emeritus, The New England Journal of Medicine; Frank Stanton, former president of CBS Inc.; Grant Tinker, president, GTG Entertainment, Inc. and former chairman, National Broadcasting Company; Marvin Traub, former chairman, Bloomingdale's; Jack Valenti, president, Motion Picture Association of America; and Ruth Wooden, president, the Advertising Council, Inc.

Center for Quality of Care Research and Education (QCaRE)

R. Heather Palmer, Lecturer on Health Services and Director of the Center for Quality of Care Research and Education (QCaRE)

Over the past decade, health care policy has been dominated by issues of cost containment and access to health care. Policy makers have found, however, that cost

and access concerns could not be adequately addressed without also dealing with the issue of quality of care. Within the past year alone, three major congressional initiatives focused on the management of quality care in the public sector. Projects directed at quality measurement and improvement have sprung up in the private sector, spreading interest worldwide.

QCaRE conducts research on quality of care and sponsors a weekly quality of care research seminar series. QCaRE also teaches in the Department of Health Policy and Management degree programs, promotes student thesis work and postdoctoral research on quality of care, and works to establish partnerships with health care institutions, agencies, and organizations involved in the measurement and improvement of health care quality. Students interested in quality of care should consider taking the following courses: HPM 256c, 257c, 258d, and 259d.

QCaRE's current research includes two major interdisciplinary multi-site projects. The PROSPER project, "Patient Reports on System Performance," is a collaborative project with the Harvard Community Health Plan and the Henry Ford Health System in Detroit. It involves development and assessment of the validity of patients' reports on the performance of clinical management systems. The DEMPAQ project, "Project to Develop and Evaluate Methods for Promoting Ambulatory Care Quality," is directed at developing methods for the Health Care Financing Administration's physician peer review organizations to use in promoting quality of care in physicians' offices. QCaRE is leading this collaborative effort with researchers from Johns Hopkins School of Hygiene and Public Health and the Park Nicollet Medical Foundation in Minneapolis. The demonstration is occurring in three states: Alabama, Iowa, and Maryland.

Center for Risk Analysis

John D. Graham, Professor of Policy and Decision Sciences and Director of the Center for Risk Analysis

The mission of the Harvard Center for Risk Analysis is to foster a reasoned public response to health and safety hazards that arise from industrial and commercial activities. Major problem areas include consumer and worker exposures to toxic chemicals; community exposures to air and water pollution from factories; agricultural pesticide residues in drinking water; drug and food safety; and residential exposures to asbestos, lead, and radon.

The center defines "risk analysis" broadly to include the interrelated tasks of risk assessment, risk evaluation, risk management, and risk communication. Major center activities include research stimulation, curriculum development, the facilitation of risk communication, and public policy analysis. Many of these activities are conducted collaboratively with professionals from business, labor, government agencies, and public-interest groups.

The center sponsors a monthly invitational seminar series that draws faculty, students, and practitioners together to discuss current issues in risk analysis. Students are also encouraged to undertake applied research projects and dissertations on risk-related topics. Where appropriate, the center links students with prospective employers in the public and private sectors.

Center for Injury Control

John D. Graham, Professor of Policy and Decision Sciences and Director of the Center for Injury Control

The Harvard Center for Injury Control promotes the prevention and treatment of trauma through scientific research, policy analysis, training, and communications. Prevention, emergency and acute care, and rehabilitation are all essential components of injury control. Research efforts encompass unintentional injuries as well as intentional violence such as suicide and child or spouse abuse. Injury in America persists as the leading killer of children and young adults, and the estimated cost to society is $158 billion per year.

The center, a collaborative enterprise based at the Harvard School of Public Health, works with experts at the Harvard Medical School, Boston University School of Public Health, Tufts University, the New England Medical Center, and the Education Development Center, Inc. to achieve its goals. The center also collaborates with the Massachusetts Department of Public Health and other government agencies.

Current research priorities include motor vehicle crash injuries, hip fractures among the elderly, and unintentional injuries among adolescents. The center sponsors two injury control courses at the Harvard School of Public Health and organizes seminars on contemporary issues. The field of injury control offers challenging research project opportunities and a myriad of timely dissertation topics for public health students. The center also provides information on careers within this dynamic field of public health.

Committee on Bio- and Public Health Mathematics

A Committee on Bio- and Public Health Mathematics has been formed to advise students, coordinate course offerings and promote research and general education in mathematics as applied to scientific problems in public health and medicine. The Committee is made up of faculty drawn from several Departments and Programs throughout the School.

Members of the Committee address a wide variety of health issues and biological problems with mathematical tools. This often requires the development and implementation of novel techniques. Topics of current research include: population dynamics and demography, epidemic models, parasite-host relationship, chemical mutagenesis, compartment models and toxic drugs, fluid dynamics, static and continuum mechanics at both the cellular and organ level, models to asses policy interventions, natural selection and population genetics of pathogens, and diffusion processes under controlled and "natural" conditions. Many Committee members have special interests in developing models for the study of complex biological systems.

Students may take a concentration (10 credits) in Bio- and Public Health Mathematics. Among the course offerings in the School are: Bio 260 (introductory course in mathematical modeling, T. Awerbuch) and Pop Sci 350 (Complex systems, R. Levins). Tutorials on special topics may be taken under the guidance of members of the Committee. In addition courses given in other parts of the University may fulfill the concentration requirements. A seminar on Bio- and Public Health Mathematics meets periodically. Interested graduate and post-doctoral students should contact one of the co-chairs (Professor Richard Levins (617) 432-1484 and Dr. Tamara Awerbuch (617) 432-1056).

Harvard University W.H.O. International Collaborating Center for Health Legislation

William J. Curran, Frances Glessner Lee Professor of Legal Medicine, Emeritus and Director of the Harvard University/WHO International Collaborating Center for Health Legislation

The center conducts research and training on a collaborative basis with the World Health Organization in the field of health legislation. The center, the first of its kind in the world, has been involved in international comparative studies in health legislation policy in alcohol and drug dependency treatment, hospital organization and management, and AIDS control, prevention and treatment. The primary aims of the center are as follows:

- Develop a program of interdisciplinary research and consultation in health legislation
- Establish an educational program on the international aspects of health legislation and policy
- Establish a program of visiting scholars in health legislation
- Aid the Health Legislation Program of the World Health Organization in collecting and distributing information on legislative developments in WHO member states around the world

The center has an international advisory board with members from all over the world. The advisory board works with the faculty in developing the research and education programs of the center. For further information on the center's research efforts and the program for visiting scholars, contact the center offices at 677 Huntington Avenue, Boston, MA 02115, or call 617/432-4513, FAX 617/432-4494.

Kresge Center for Environmental Health

John B. Little, James Stevens Simmons Professor of Radiobiology and Director of the Kresge Center for Environmental Health

The Kresge Center serves as a focal point for environmental health-related research and training activities in the Harvard School of Public Health. It includes programs within departments such as Cancer Biology, Environmental Health, Epidemiology, and Molecular and Cellular Toxicology. Full-time faculty within the center include physicians, engineers, physiologists, cell and molecular biologists, toxicologists, chemists, mathematicians, and physicists. This diversity enables the staff to deal effectively with environmental and occupational health problems which require a multidisciplinary approach.

The center conducts research and training in the following areas: occupational health and safety; air pollution health effects and control; biochemical toxicology; radiation biology and radiological health (radiation protection); respiratory biology (inhalation toxicology); and environmental health engineering and management.

Students interested in pursuing degree programs in these areas enroll in the relevant department of the Harvard School of Public Health. Students whose primary interest is in problems of hazardous waste, water quality, and water resources may apply to degree programs in Environmental Health Management or to the Division of Applied Sciences of the Graduate School of Arts and Sciences.

Educational Resource Center for Occupational Safety and Health

Richard R. Monson, Professor of Epidemiology and Director of the Educational Resource Center for Occupational Safety and Health

The primary objective of the Educational Resource Center is to train occupational safety and health professionals to recognize and prevent occupational injuries and disease. This training effort is directed toward the development of public health perspectives, the acquisition of skills and knowledge for prevention, and the creation of sensitivity about the political climate in which professionals must act. Through the center's programs, teams of professionals learn to identify and prevent occupational impairments, disease, and injuries through the control or elimination of harmful occupational exposures.

Since occupational health relies upon a number of disciplines to provide the elements of prevention and problem solution, the training is multidisciplinary in nature. Descriptions of the full-time academic programs at the master's and doctoral levels are included with the description of the Department of Environmental Health. Employment opportunities exist in universities, governmental agencies, industry, labor unions, consulting firms, hospitals, and clinics.

The center is partially supported by a grant from the National Institute for Occupational Safety and Health (NIOSH). Traineeship awards consisting of tuition, stipend, and health fee may be available on a competitive basis to qualified individuals undertaking approved training programs in occupational medicine, industrial hygiene, and occupational health nursing.

Decisions regarding funding are made independently from the application process. All United States citizens and permanent residents are automatically considered for funding.

Other facets of the center include a substantial sponsored research program spanning a variety of occupational health problems and drawing upon the expertise of scientists in many disciplines. The center offers mid-career training through short-term courses, seminars, and workshops for physicians, nurses, industrial hygienists, safety engineers, and other occupational safety and health professionals, paraprofessionals, and technicians. The center also has an outreach program which networks with academic institutions, agencies, professional societies, public health departments, unions, companies, and community associations within the New England region.

For more information write to Mr. Daryl Bichel, HSPH, 665 Huntington Avenue, Boston MA 02115, or call 617/432-3314.

Office of Continuing Education

Dade W. Moeller, Professor of Engineering in Environmental Health and Associate Dean for Continuing

Since 1982, the Office of Continuing Education has sponsored professional education courses for mid-career professionals to allow them to keep abreast of trends and new information in occupational and environmental health fields.

Programs Office of Continuing Education courses are designed to give professionals new information and techniques to take back to the workplace for immediate implementation.The practical curriculum includes courses in industrial hazards, ergonomics, planning for nuclear emergencies, legal aspects of occupational and environmental health, and managing health care organizations. During the 1992-93 academic year, the office will present more than 35 courses, ranging in length from two days to two weeks, designed for professionals in medical management, nuclear safety and radiation protection, occupational health and safety, environmental management, and environmental and occupational law.

Courses are presented by faculty members of the School of Public Health, supplemented by recognized leaders working in occupational health and medical management fields. Selected courses use the case method of instruction; others include laboratory sessions and demonstrations with standard field equipment. Course participants are encouraged to share their own experience with other participants and with the faculty, to create a dynamic learning environment.

The Office of Continuing Education draws participants on an international scale, attracting physicians, industrial hygienists, health physicists, radiation protection professionals, scientists, and engineers. Most participants are employed by public health and regulatory agencies, industrial installations, public utilities, health care organizations and consultant groups. Approximately 2000 professional personnel will have attended these programs in the 1991-1992 academic year.

Career Outlook Participants in OCE courses are proven professionals, experienced in the issues related to their positions and their careers. Employers increasingly look to participants in these Harvard programs to take on new job responsibilities, define new policy, and steer organizations through periods of change. All courses are approved for continuing education credit by industrial and medical licensing boards.

The following is a preliminary list of courses to be presented by the Office of Continuing Education.

For more information and for a complete list of courses, call the Office of Continuing Education at 617/432-1171.

1992

June 22 August 14	*Managing Health Programs in Developing Countries*
July 13-17	*Management and Disposal of Radioactive Wastes*
July 20-24	*Advanced Workshop on Nuclear Emergency Planning*
Aug. 3-7	*Emergency Planning for Chemical Accidents*
Aug. 17-21	*Occupational and Environmental Radiation Protection*
September 9-11	*Risk Analysis in Environmental and Occupational Health*
September 21-25	*Industrial Ergonomics*
October	*Radiation Litigation: Statutory Employer and Summary Judgment*
October 4-9	*Directing Programs in Managed Care*
October 26-30	*Fundamentals of Industrial Hygiene*
November 2-5	*Ambulatory Care: Leadership in a Changing Environment*
November 6-14	*Program for Health Systems Management*
November 9-11	*Commercializing Biomedical Technologies*
November 16-20	*Guidelines for Laboratory Design*
December 1-3	*Indoor Air Quality*
December 7-11	*Software Applications Grand Rounds*

1993

January 17-29	*Programs for Chiefs of Clinical Services*
March 8-12	*Managing Physicians: The Relationship between Physicians and Health Delivery Organizations*
March 22-26	*Occupational & Environmental Radiation Protection*
March 22-26	*Fundamentals of Industrial* Hygiene

Admissions • Registration • Financial Aid

Admissions

Application forms for admission to all degree programs and information regarding nondegree student status can be obtained from the Admissions Office, HSPH, 677 Huntington Avenue, Room G-4J, Boston, MA 02115 or call 617/432-1030.

Application for Admission

Applicants or potential applicants who have questions about admission requirements, degree programs, or any other aspect of applying to, or enrolling in, the school should contact the Assistant Director, HSPH, 677 Huntington Avenue, Boston, MA 02115, or call 617/432-1031.

The section, Degree Requirements, and the departmental descriptions in this Register discuss some of the requirements for admission to particular degree programs. In addition to meeting these requirements, applicants must satisfy the school's Committee on Admissions and Degrees as to their ability to undertake graduate study. The final decision as to the admissibility of an applicant rests with this committee.

Applicants may apply to one degree program (i.e., MPH, MS, DS, etc.) only and must specify the specialty area or areas in which they plan to take the degree. If the applicant desires to take a joint program in two specialty areas, both areas should be specified and requirements for admission to both areas must be satisfied.

Admission of a candidate is for a particular year; if enrollment at that time is not possible, reapplication is necessary and will be considered on the same competitive basis as a new application. Requests for deferments and other exceptions must be made in writing to, and approved by the Committee on Admissions and Degrees.

Applicants who wish to be considered for financial aid should submit their completed applications and Financial Aid Form no later than February 1, 1993 in order for their files to be complete by March 15.

Application Deadlines

Master's Degree Programs Applicants who require early decision may submit applications and all supporting documentation by November 1, 1992. These early applications will be reviewed and acted upon by January 1, 1993, at the discretion of each department. Applications to masters degree programs received between February 1 and March 31 will be considered if space is available.

Doctoral Degree Programs All applications and supporting documentation should be submitted by January 15, 1993. Applications to doctoral programs in the laboratory sciences received after this date will not be considered. Applications to other doctoral programs will be accepted until March 31, 1992, and will be considered if space is available. Applicants whose application is complete by January 15 will receive notification of the School's decision by March 15, 1993. The final application deadline for Clinical Effectiveness applicants only will be April 30, 1993.

Application, Supporting Documentation, and Application Fee Please refer to the detailed instructions in this Register and those accompanying the application. An application for admission is not considered complete and will not be processed until the following documentation is received by the Admissions Office:

- A completed, signed application form, application file card, mailing labels and a 500 word essay describing your professional history, your area of interest at HSPH and your professional goals
- Official transcripts of academic records at colleges, graduate schools, and/or professional schools, with certification of degrees conferred (See Application instructions), Courses taken and grades received
- Letters of recommendation from at least three people who are well acquainted with your previous academic work and professional experience
- Official scores of the Graduate Record Examination (GRE) (See Standardized Tests, following)
- Official Scores of the Test of English as a Foreign Language (TOEFL), if applicable (See International Students, following)
- A nonrefundable application fee of $60 in the form of a check drawn on a bank in the United States, a postal money order, or an international money order payable to the Harvard School of Public Health

Applicants are responsible for assuring that all materials are received by the Admissions Office by the application deadline. The materials submitted become the property of the Harvard School of Public Health.

Tuition Deposit Admitted applicants must submit a $200 tuition deposit when confirming acceptance of the offer of admission (usually no later than May 1). This deposit is credited to the fall term bill and is not refunded if the student fails to register.

Policy of Nondiscrimination The policy of Harvard University is to make decisions concerning applicants, students, faculty, and staff on the basis of the individual's qualifications to contribute to Harvard's educational objectives and institutional needs. The principle of not discriminating against individuals on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or disability unrelated to job or course of study requirements is consistent with the purposes of a university and with the law. Harvard expects that those with whom it deals will comply with all applicable anti-discrimination laws.

Increasing numbers of students with disabilities are enrolling at Harvard and are participating in a wide range of programs and activities. Every effort is made to meet special needs. There are, however, no separate academic programs for either the physically handicapped or for students with learning disabilities; all enrolled students undertake the same program.

Standardized Tests All applicants to the school are required to submit official scores from the Graduate Record Examination (GRE), or the Dental Admission Test (DAT), or Graduate Management Admission Test (GMAT), or Medical College Admission Test (MCAT) as appropriate to the applicant's background. Lawyers applying to the Master of Public Health program may submit official score reports from the Law School Admission Test (LSAT). These are the **only** standardized tests accepted by the Harvard School of Public Health. NO OTHER TESTS ARE ACCEPTABLE.

Since applications will not be considered without test score results, applicants planning to take a standardized test should do so no later than the December test date. Results of the December examination are generally not available any earlier than 6-8 weeks after the examination. Applicants with prior test scores may submit Official Score Reports with their applications. Information regarding registration and test administration dates for the GRE may be obtained by writing to Graduate Record Examinations, CN 6000, Princeton, NJ 08541-6000, 609/771-7670.

Exceptions to the requirement for submission of a standardized test score are rarely granted. In unusual circumstances, however, when an applicant is unable to provide scores from a standardized test because of war, the inavailability of the test in a given country, etc., a detailed written request to waive this requirement may be submitted with the application. The waiver request should describe the circumstances that prevent submission of test scores. An applicant's professional experience or previously earned degrees, is not sufficient grounds for waiving the test requirements. **If the waiver is denied, the applicant must be prepared to take the GRE by the December deadline.**

Additional information concerning the standardized test requirement is included in the instructions accompanying the application.

International Students

Test of English as a Foreign Language (TOEFL) All students applying from countries where English is not the language of instruction must submit scores for the TOEFL. The TOEFL score must be no more than two years old.

A TOEFL score of 550 or above is required for admission to a degree program. Applicants from abroad may be admitted to special student status with a TOEFL score of less than 550 (See Special Students under Admission to Nondegree Status, below). However, they may be advised to enroll in an English course while attending courses at the HSPH.

Applicants are advised to register to take the test no later than the November test date, since applications for admission will not be considered without the TOEFL score. The TOEFL is administered six times a year at centers throughout the world. Information regarding registration, testing locations, and test administration dates may be obtained by writing to TOEFL Services, CN 6151, Princeton, NJ 08541-6601, 609/771-7670.

Financial Certification If admitted to the school, foreign nationals, whether residing in the United States or not, must provide certification of their financial resources before the immigration form needed to obtain a visa will be issued. The completion of the Financial Certificate form (supplied to admitted applicants) is required. International students must have sufficient funds available in United States currency to pay the expenses for the full period of their academic program, and show proof that they are permitted to exchange or export these funds.

In addition to providing this certification, international students wholly supported by personal funds, family funds, or sponsor's funds which are given directly to them are required to deposit certain amounts in the United States. Funds adequate to cover, at a minimum, the first semester's tuition, fees, and living expenses must be deposited in an escrow account in a bank in New York, New York or Boston, Massachusetts. It is recommended that funds adequate to cover the second semester's tuition, fees, and living expenses also be deposited in a bank account in the United States. Before the immigration form can be issued, an official letter stating the amount in United States dollars must be sent directly from the bank to the Admissions Office for each account.

An estimate of living expenses in the Boston area is included in the section, Living Expenses. International students should use the applicable estimate when calculating funds required for financial certification.

Academic Credentials The school must receive official transcripts of all academic records presented for admission. These transcripts must bear the institution's official seal, be signed across the seal by the proper authority, and be placed in a sealed envelope. These transcripts must show the courses taken, the grades received, and the degree granted. **All international documents must be translated.** Applications may be processed for admission with "unofficial" copies of academic credentials. However, under no circumstances will an admitted applicant be allowed to matriculate if official academic credentials have not been received by the Admissions Office. For more information about this requirement, please refer to the instructions accompanying the application form.

Employment International students who hold an MD degree and either an F-1 or J-1 visa under the sponsorship of Harvard University are not permitted to accept any employment for which an MD degree is a prerequisite while in this country. For more information, contact the Harvard University International Office (telephone 617/495-2789).

Hospital Insurance All nonimmigrant students from abroad are required to enroll in the Harvard Blue Cross/ Blue Shield student insurance plan. There can be no exception to this requirement. For more information about the plan, please refer to page 58.

Admission to Nondegree Status

Certain individuals are permitted by application to the register to study at the school while in nondegree status for up to ten credits per semester. The categories of nondegree students are Harvard faculty and staff, Harvard Affiliates, HSPH Alumni/ae and certain other Boston-area medical professionals. In each case, enrollment in courses is subject to the availability of space and the permission of the instructor; in courses with limited enrollment, preference is generally given to degree candidates. Payment in each case is due prior to or at the time of registration and is not refun-dable. Admission to nondegree status carries with it no commitment to accept the student as a degree candidate.

Harvard Faculty and Staff Persons holding Harvard Corporation appointments of at least half-time teaching faculty are permitted to enroll in courses at the school with the permission of the instructor and the registrar. Harvard staff should consult the Office of Human Resources about the provisions of the Harvard Tuition Assistance Plan. Harvard faculty and staff generally take a maximum of five credit units per semester.

Harvard Affiliates Graduates of the Harvard School of Public Health, full-time employees of an institution affiliated with Harvard, and persons at Harvard University not covered in the preceding paragraph, who hold at least a bachelor's degree, may apply for affiliate status. Applicants admitted to affiliate status generally take no more than five credit units per semester. No auditing is permitted. Applications for affiliate status can be obtained only by coming in person to the Registrar's Office no earlier than one week prior to the start of the course.

Boston-area Medical Professionals interested in taking HSPH courses should contact the registrar for enrollment information and requirements.

Special Students Procedures and requirements for the admission of half-time and full-time special students (nondegree) are the same as for degree candidates, and in general, special student status is governed by the same policies that apply to all matriculated students. (Exception: At the discretion of the Committee on Admissions and Degrees, foreign students applying for degree candidacy may be admitted to special student status if their TOEFL is less than 550. These students may petition the Committee on Admissions and Degrees for reconsideration for degree candidacy upon receipt of a TOEFL of 550 or better (See Retroactive Credits following).

Applicants should specify on the application form the courses they plan to take. Special students are not allowed to audit courses. Those enrolled less than full-time are not permitted to cross-register into other Harvard schools or MIT. Admission to special student status is limited to one academic year. Special students who wish to be admitted to degree candidacy, other than the exception described in the preceding paragraph, must reapply and will be considered on the same basis as other applicants for admission.

Retroactive Credits Applicants to degree programs who have previously taken courses at the school while in non-degree status may, at the time of their application, petition to count up to ten credit units retroactively as part of the academic credit requirements. These courses must have been taken within three years of the date of entrance into the degree program and cannot be or have been counted toward any other degree at this school or at any other school. A request for retroactive degree credit must be approved by the department or program with which the student is affiliated and by the Committee on Admissions and Degrees. Permission may be granted if the courses fit into the applicant's academic program. Tuition credit will not be given for previous course work, and students are expected to meet full tuition requirements for the degree. Applicants who were cross-registered at the Harvard School of Public Health while enrolled at another Harvard-affiliated school must include with their petition an official transcript from the other school, as well as a letter from that school's registrar stating that the courses taken at the School of Public Health have not been counted toward a degree.

Registration

Registration Procedures

Every resident degree candidate is expected to register until the requirements for the degree are fulfilled or until degree candidacy is terminated. Every resident student, whether full-time or half-time, must register in person at the beginning of each semester. The Registrar's Office cannot accept registration forms from any other person than the student who is registering.

Registration for fall semester 1992 is September 16 for new students and September 17 - 18 for returning students. Registration for spring semester 1993 is January 18 - 29, 1993. Students cross-registering into other schools must meet the earlier deadline set by either HSPH or the school offering the course. A fee of $65 per week is charged for late registration and/or for late submission of the registration form.

The first step of registration involves picking up registration materials and information during the formal registration period. At this time, students will supply the Registrar's Office with biographical information, will be informed of their academic adviser, and will have an opportunity to pay their student term bill.

To complete the registration procedure, each student meets with his/her adviser to plan a course of study for the semester. The student then must file a registration form with the Registrar's Office. Registration forms must be submitted in person and may not be submitted by persons other than the student without requesting, in writing, special permission from the Registrar. Students who wish to take courses jointly offered (cross-listed) by the HSPH and other Harvard schools must register for these courses at the HSPH using the HSPH course catalogue code. Students who wish to cross-register for a course offered by another school must obtain a cross-registration petition from the Registrar's Office at the HSPH, complete it, obtain the instructor's signature, and take it to the Registrar's Office of the school offering the course. Students should note that undergraduate-level courses do not count toward total credits taken at HSPH, that those courses will not be included on the HSPH transcript, and that the grade points received will not be counted toward the HSPH Grade Point Average.

Students may not enroll in classes that meet at the same or overlapping times.

Courses may be audited only by HSPH degree candidates; these courses will not appear on the student's official transcript.

Doctoral students should have passed their oral examination prior to registering for research credits. When a doctoral student has not passed the oral examination, but he/she has completed all coursework, he/she may register for research credits for one semester only by obtaining the department chair's and the adviser's signatures on the registration form.

Drop/Add/Change Policy

A student may drop a course, add a course or change the grading option of a course without penalty within the first two weeks of each the "a", "ab", "b", "c", "cd" and "d" periods. The Drop/Add/Change deadline for the "e", "f" and "s" periods is the end of the first day of each of these periods. A student may petition the Committee on Admissions and Degrees to drop, add or change grading options after the published Drop/Add/Change deadline only if a grade has not been given on

any quiz or work assigned. Drop/Add/Change petitions will not be accepted after the published deadlines except in extreme circumstances. In these circumstances, the student should continue attending the class and must obtain his/her instructor's and adviser's signatures on the Drop/Add/Change petition certifying that a grade has not been received by the student to date. This petition then is subject to the approval of the Committee on Admissions and Degrees. In addition, after the Drop/Add/Change deadline, a $75 late fee will be assessed to the student's term bill for each petition approved. If a petition is not approved, the student will not be charged, nor will courses be added or dropped, and grading options will not be changed. A student can petition to add, drop or change up to three courses per form.

Drop/Add/Change forms cannot be accepted by the Registrar's Office if submitted by a person other than the student listed on the drop/add/change form.

International Students

All international students must report to the Harvard International Office HIO, 1350 Massachusetts Avenue, Cambridge, **prior** to registering for their first semester at the school. There they must present their passports and entry permits or other evidence of their immigration status. After these documents have been presented at HIO, students will be issued a "blue slip" to present at registration before they are allowed to register. This requirement applies to all students who hold an F-1 student visa, or a J-1 exchange visitor visa.

Course Load Requirements

All degree candidates are expected to register as either full-time or half-time students. Any exceptions to this requirement must be approved by the Committee on Admissions and Degrees and generally are approved for only one semester.

Students must take a minimum of 40 credit units for the year to be registered as full-time. Students normally take 20 credit units per semester. However, a full-time student may take a minimum of 15 units in a semester, with a minimum of 5 units in any one period, and may register for a maximum of 25 units per semester. To take more than 25 units in a semester, a student must submit a petition to the Committee on Admissions and Degrees at the time he or she submits the registration form. Full-time students who take more than 40 units in a year are not charged additional tuition.

Students in the two-year, 80-unit Master of Science program may take a minimum of 35 units in either year and a total of 80 units over the two-year program. Any exceptions to this requirement must be approved by the Committee on Admissions and Degrees.

Students who are accepted into two consecutive one-year programs (40 credit units each) and who are awarded one degree at the end of the first year must fulfill the requirements for a one-year (40-unit) program during the second year. Credit units may not be carried over from the first program into the second. Persons in a 60-unit master's degree program must follow the guidelines for students in an 80-unit degree program, except that all 60 units must be taken within three consecutive semesters. Any exceptions to this requirement must be approved by the Committee on Admissions and Degrees.

Half-Time Students

Half-time students generally complete a one-year program in two academic years. A regular program for half-time students consists of 10 credit units per semester, although they may register for a minimum of 7.5 and a maximum of 14 credits per semester for a total not to exceed 25 credits per year. Units over 25 per year are assessed an additional tuition charge of $425 per credit unit; tuition paid for units over 25 per year may not be applied toward total tuition requirements (See Expenses and Financial Aid). Half-time students wishing to take more than 25 units per year must petition the Committee on Admissions and Degrees for approval, in addition to paying extra tuition for the additional units, and having their status changed from half-to full-timed status for insurance and immunization purposes.

All degree candidates are expected to submit an application for degree (available in the Registrar's Office) prior to the deadlines published in the Student Handbook to be eligible for a degree in either the November, March or June degree-granting period. Failure to apply for the degree by the deadline will prohibit the student from obtaining the degree in that period, and, if the degree granting period in question is June, from participating in Commencement activities.

Tuition and Fees for Academic Year 1992-93

Degree Candidates 1992-93

Full-time resident tuition	$15,675 * †
Half-time resident tuition	7,850 * †
Up to 25 credit units per year; credits over 25 will be charged $425 per credit.	

Doctoral full-time reduced tuition	7,850 * †
Doctoral half-time reduced tuition	3,950 * †
Doctoral facilities fee (resident)	1,975 * †
Nonresident full-time doctoral fee	1,650 †
Nonresident half-time doctoral fee	945
Summer Program in Clinical Effectiveness	5,878
Continuation in half-time degree program for Clinical Effectiveness participants (1992-1993)	1,960 * †
Continuation in half-time degree program for Clinical Effectiveness participants (1993-1994)	Billed at half-time tuition rate * †
Continuation in full-time degree programfor Clinical Effectiveness participants (1992-1993)	9,797 * †
Leave of Absence Fee (for each semester that student is on approved leave)	200

Special Students

Enrolled for more than 10 credit units: Tuition as stated above for full-time or half-time attendance.	
Enrolled for up to 10 credit units:	
Each credit unit of work per semester	425

Summer Session (1993)

Five credit unit summer program for degree candidates who register and receive credit for research or supervised study during summer session.	1,995

Dissertation Fee

Final doctoral tuition fee	850
For the semester in which a dissertation formally is approved and accepted by the department and the Committee on Admissions and Degrees, a doctoral degree candidate must have paid at least this amount.	
University Health Services Fee (billed separately)	584
Compulsory fee for all full-time degree candidates and Special Students enrolled for 15 or more credit units.	

Hospital Insurance

Blue Cross/Blue Shield (billed separately)	600 * *
This is compulsory for nonimmigrant foreign students who do not have comparable U.S. based insurance.	

Late Fees

Late check-in fee	65/wk

Drop/Add Fee

After published deadlines - per CAD petition	75

* Billed the University Health Services (UHS) fee; see the Registrar's Office for waiver information prior to registration if you are registered for half-time or fewer credits. This fee is compulsory for students registered at more than half-time status.

† Billed the Blue Cross/Blue Shield Insurance Coverage; see the Registrar's Office for waiver information prior to registration.

* * Health insurance is required for all international students. Family Health insurance is available for all students at an additional cost.

Full-time non-resident doctoral students automatically are enrolled in Blue Cross/Blue Shield (BC/BS) insurance according to Massachusetts State Law. Full-time non-resident students wishing to waive the BC/BS coverage must return a completed waiver form to the Student Insurance Office in Cambridge prior to the first day of Registration. Full-time nonresident students are not enrolled in the University Health Services (UHS). Half-time non-resident students are not enrolled in BC/BS or UHS. Students on Leave of Absence are not enrolled in BC/BS or UHS. If coverage is needed, contact the Student Insurance Office in Cambridge at 495-2008 to inquire about special non-registered rates.

Students registered at a half-time status or less (14 or fewer credits per semester, not to exceed 25 credits per year.) may waive the UHS coverage by obtaining and completing the UHS waiver form from the Registrar's Office prior to the first day of Registration. If a half-time student takes over 25 credits per year, and has waived the UHS fee, the UHS fee will be charged retroactively for one semester.

Financial Clearance

Degree Candidates The filing of a registration form is necessary to complete registration. The Registrar's Office will not allow a student who is not financially clear to register. *To be considered financially clear, students must pay all past charges due to the university* and must take one of the following actions toward payment of the current semester's tuition and fees:

- Pay the current semester's charges in full.
- Enroll in the Monthly Payment Plan and pay the first month's installment prior to registering. This allows students to pay one-quarter of the semester's charges by registration and to spread the rest of the payments over the next three months. Students can request an application for the Monthly Payment Plan by writing the student billing office, 566 Holyoke Center, Cambridge MA 02138. If the application is approved, the fee for this service is $25 per semester. Default on the Monthly Payment Plan will result in the student's administrative withdrawal from degree candidacy at HSPH.

- Obtain documentation from the school's Financial Aid Office that loans will cover the semester's full tuition and fees.

- Provide documentation in the form of an official award letter to the Registrar prior to registration that tuition and fees are being directly billed to and will be paid in full by a sponsoring organization.

Any student whose indebtedness to the university remains unpaid on the date fixed for payment will be denied all privileges of the university (administratively withdrawn from degree candidacy) and may not attend classes.

Billing Address Term bills are sent to a student's billing address unless the Student Billing Office (located in Room 556 of Holyoke Center in Cambridge) is notified in writing to send them elsewhere. Please keep the Registrar's Office and the Student Billing Office informed of any changes in addresses.

Nondegree Students Harvard faculty and staff, Harvard alumni/ae, affiliates, and special students must pay all tuition and fees for the semester in full when they register. Payment is not refundable if the student elects to drop the course(s). Non-degree candidates may not audit HSPH courses. All deadlines and late fees apply to non-degree students, and all nondegree students are governed by the same rules and regulations outlined for degree candidates.

Tuition Requirements

After admission to HSPH and until fulfillment of the requirements for the degree, all degree candidates must be registered continuously in one of the following registration categories:

- Resident students

- Nonresident doctoral students

- Students on Leave of Absence

Degree candidates must pay full tuition for a designated number of years, depending on their degree program and their previous affiliation with the school. All degree candidates must pay the appropriate tuition rate for each registration period as outlined on the Tuition and Fees schedule; tuition may not be paid by degree candidates on a "per credit" basis, except for half-time degree candidates who take over 25 credit units for the year. Any degree candidate who registers for less than full-time must in any event fulfill the full-time, full-tuition requirements for the degree. Tuition for summer school courses, additional tuition paid by half-time degree candidates for credits over 25 credits per year and tuition paid by affiliates or Tuition Assistance Plan (TAP) Participants will not be credited toward any tuition requirements for the degree. Accumulation of tuition paid by non-resident doctoral students will not be credited toward the two-year full-time and one-year full-time reduced tuition payment requirement.

Resident Status All degree candidates who are enrolled in courses or who intend to use any Harvard academic facilities (e.g. libraries) must register as resident students.

Tuition requirements for resident doctoral students are listed below.

1. Students who previously have not attended HSPH pay a minimum of two years of full tuition and one year of full-time reduced doctoral tuition or the equivalent for half-time degree candidates.

2. Students who have received a one-year master's degree from HSPH within three years of enrolling in a doctoral program in the same discipline pay a minimum of one year of full tuition and one year of full-time reduced doctoral tuition or the equivalent for half-time degree candidates.

3. Students who have received a two-year master's degree from HSPH within three years of enrolling in a doctoral program in the same discipline pay a minimum of one year of full-time, reduced doctoral tuition or the equivalent for half-time degree candidates.

4. Students who have received a Master of Public Health degree and a Master of Science degree from HSPH within three years of enrolling in a doctoral program in the same discipline as one of the HSPH master's degrees pay a minimum of one year of full-time, reduced doctoral tuition or the equivalent for half-time degree candidates.

5. After the tuition requirement has been met, students pay a facilities fee, enabling students to use Harvard academic facilities.

Nonresident Doctoral Students Doctoral students who have passed their oral exam, who no longer reside in the Boston area and who have received permission from their department and the Committee on Admissions and Degrees (CAD) to pursue a portion of their program as a nonresident student, are charged the applicable nonresi-

dent doctoral fee. Students in this category normally have completed payment of at least the required two years of full-time tuition and one year of reduced doctoral tuition before applying for nonresident status; they must in any case complete this payment prior to their graduation and will be billed accordingly while in nonresident status to complete the tuition degree requirements. Full- and half-time non-resident status is granted by the CAD for only one year at a time. Students must reapply to the CAD yearly for renewal of this status. Students who fail to reapply on a yearly basis will be administratively withdrawn from degree candidacy.

The nonresident doctoral fee covers periodic consultation with the student's doctoral adviser but does not provide for the use of Harvard facilities or for the issuance of a Harvard identification card or Medical area photo I.D. card. Also, students registered for half-time nonresident status may not qualify for deferment of educational loan. Upon expiration (or early termination) of CAD permission for nonresident status, or if the doctoral student requires the use of Harvard facilities during nonresident status, the appropriate resident rate will be charged.

Students on Leave of Absence Degree candidates who, during a given registration period, will not be engaged in any study or research for a degree from the school, and who will not be making use of Harvard facilities, must apply for a Leave of Absence. The application should be made prior to the registration period for the semester during which the Leave of Absence would begin. Students on Leave of Absence are required to pay the current year's Leave of Absence fee to maintain their degree candidacy. Upon expiration or earlier termination of the leave of absence, students are charged the appropriate tuition rate. Leaves of Absence are granted by the CAD for a maximum of one year at a time. Students must reapply yearly for renewal of this status. Students who fail to reapply on a yearly basis will be administratively withdrawn from degree candidacy. It is assumed that doctoral students on Leave of Absence are not participating in any research activities that may contribute to their dissertation.

If a student on Leave of Absence does not officially register for the semester he/she is expected to return to HSPH, the student automatically is withdrawn from degree candidacy. If, at a later date, with the consent of the Registrar and the student's department and adviser, the student wishes to be reinstated into degree candidacy, the student either must pay the current year's Leave of Absence fee for each semester the student was away from HSPH, or reapply for admission to the school.

Field Studies Field opportunities, listed under each department's course offerings and bearing the course number 330, often entail travel expenses that must be met by the student. Information about estimated expenses should be obtained from the appropriate department offering the study.

Student Health Insurance

University Health Services University Health Services (UHS) provides comprehensive prepaid medical care such as physical examinations, physician visits, laboratory tests and psychological counseling. Students may establish a relationship with a particular UHS physician and may use the drop-in clinic for acute medical and surgical situations. Payment of the University Health Services fee is compulsory for all full-time students. Students who are half-time or less may complete a form available from the HSPH Registrar prior to the first day of registration to waive the UHS coverage.

Blue Cross/Blue Shield The Blue Cross/Blue Shield (BC/BS) medical insurance plan, charged separately from the University Health Services fee, covers the cost of many types of medical care not offered at University Health Services. Students may enroll in the plan in September or January; coverage extends through August 31. Students graduating either in the November or March degree periods should consult the Student Insurance Office for coverage termination information.

Nonresident full-time students and Resident full- and half-time students automatically are enrolled in the BC/BS plan. This insurance is compulsory for all nonimmigrant students who do not have comparable insurance. It is also required for all other students who do not have comparable insurance.

United States students who have comparable U.S. based medical insurance and who would prefer not to enroll in BC/BS must submit a waiver form by August 16 (for the fall semester) or January 15 (for the spring semester). Students who fail to file waivers will be responsible for any fees billed for that semester. Waivers for BC/BS insurance are approved only by the Director of the University Health Services.

A BC/BS/UHS plan for spouses (including maternity benefits) and children of full-time students is also available. The plan provides extensive benefits for ambulatory and inpatient care. All who are eligible are strongly advised to enroll. Contact the Student Insurance Office for more information at (617) 495-2008

Living Expenses

Living costs in the Boston area are higher than in many other parts of the United States. The table below lists estimated amounts that students will need in the academic year 1992-93 to cover expenses for nine months. Applicants who plan to enroll in a two-year program should allow for a 4 to 6 percent increase for the academic year 1993-94.

Estimated Minimum Student Expense Budgets For 1992-93 Academic Year *Calculated for 9 months: September - June)*

	Single	Married	Married/1 Child
Full-time Resident Tuition	15,675	15,675	15,675
UniversityHealth Services Fee	584	1,168	1,492
Student Health Insurance	600	1,782	2,680
Books/Supplies	1,000	1,000	1,000
Rent/Utilities	6,800	7,500	8,100
Food	2,000	3,000	3,500
Personal	2,931	4,350	5,300
Local Transportation	478	954	994
Total	$30,068	$35,429	$38,741

The University Health Fee is compulsory for all students. The student Health Insurance is through Massachusetts Blue Cross/Blue Shield and is required for all International students. U.S. students may waive this requirement if evidence of comparable coverage is approved by the University Health Insurance Office.

Included with the cost of books/supplies is the cost of photocopied articles and other materials which may be required for some courses. There is also a charge for photocopies made by the student.

Rents in the Boston area may be substantially higher than in other areas. In the past, apartments have been difficult and expensive to find for September. Some students have needed to use rental agents (who charge fees of up to one month's rent) and also have been required to pay at least first and last month's rent. However, as a result of the softening of the Boston area real estate market, it is possible that it will be somewhat easier and less expensive to secure housing.

International students should plan on an additional 10% for possible changes in currency exchange rates.

Please note that the following are not included in the estimate of expenses but should be considered when planning finances:

- Moving/relocation expenses
- Purchase of warm clothing
- Purchase of furniture/household goods
- Cost of car maintenance/insurance
- Day care for children
- Medical/dental expenses not covered by insurance
- Transportation costs other than local travel costs

Financial Aid

Financial Assistance for International Students

Very little funding is available for international students. Most financial aid available through the School comes from the United States government and is restricted to citizens and permanent residents of the United States. A maximum of two full-tuition grants may be available for incoming international students. An applicant must be nominated by his/her department chairman or program director for consideration by the Financial Aid Committee. Nominated international students are asked to provide verification of their need for financial assistance. Interested applicants should contact their department chairman or program director for information.

Because school funds are extremely limited for international students, other arrangements should be made to bring sufficient funds to cover tuition and living expenses. The United States Department of Immigration requires official certification of the source and amount of financial support for an international student's academic program before the immigration form needed to obtain a visa can be issued.

Financial Assistance for United States Citizens and Permanent Residents

Grants Some departments have training grants that may provide funds up to full tuition and stipend. Eligibility for these grants is based on career goals, merit, and/or financial need. An applicant should contact the administrator of the department/program to which s/he seeks admission for further information on departmental grants. Full-time degree candidates who do not receive grant support from a department and who have demonstrated financial need may be eligible for limited school grants administered by the Financial Aid Office. These grants are limited in number. Awards are made based on demonstrated financial need, merit, evidence of disavantaged background, and the needs of the particular program to which the applicant has been admitted.

Scholarships Throughout the year, a variety of scholarships may become available through university and outside sources. Some examples are scholarships for Rhode Island and Delaware residents; the Pforzheimer Fellowship for graduates of Harvard/Radcliffe College with interests in public service; and the Kennedy, Knox, and Sheldon Traveling Fellowships. Notices about these scholarships are circulated during the year.

College Work-Study Program College Work-Study is a federally funded program which assists eligible students with employment opportunities. The College Work-Study grant pays 70% of the student's wages; the employer pays 30% and an additional 10% to cover F.I.C.A. Eligibility is based on financial need, other aid received and availability of funds. Preference is given to full-time students.

Loans

Programs United States citizens and permanent residents may be considered for the loans listed on the Information on Loans chart.

Credit Some loans require a credit review for loan approvals. Credit checks are required for several of the loan programs. Following are some general guidelines lenders use to determine good or bad credit:

- Good Credit

  continuous pattern of prompt payments

  all accounts are current

  no delinquencies, defaults, or legal attachments to property

- Bad Credit

  late payments (60-90 days past due)

  consistently slow payments

  current or recent delinquencies

  collection action, accounts closed for non-payment, accounts charged off, repossession, foreclosures, or agovernment claims

  bankruptcy, judgment, suit, lien, or garnishment

  defaulted loan payments

If a student cannot obtain a loan because of a poor credit rating, HSPH has no funds available to replace the denied loans. Students are advised to review their credit records for errors and any potential problems before coming to school. Credit reports can be requested by writing to one of the following credit services:

Equifax Information Services
200 Unicorn Park Drive
Woburn, MA 01801
(617) 932-8124
Fee: $15

Trans Union Corp.
P. O. Box 350
Philadelphia, PA 19105
(617) 548-2115 (Stoneham Office)
Fee: $20

TRW
350 Fairfield Ave. Suite 301
Bridgeport, CT 06605
Fee: $10.80
(508) 580-4800 (Brockton Office)

Residents of Eastern Mass:
Credit Data of New England
P. O. Box 1941
Brockton, MA 02403
(508) 580-4800
Fee: $15

Aggregate Debt The School of Public Health has no established limits on aggregate loan debt, separate from loan program limits. Students are advised to consider several factors when accumulating loan debt:

- Anticipated salary upon graduation: education loan repayment should not exceed 15% of gross monthly salary

  Future financial goals

  Seriousness of loan defaults

  Effects of loan debt on future eligibility for credit

1992-93 Information on Loans

Loan	Stafford/GSL	Supplemental Loan for Students (SLS)	Perkins Loan	Health Education Assistance Loan (HEAL)	SHARE/GradSHARE PEP
Interest Rate	*New Borrowers:* 8%-1st four years of repayment; 10% thereafter. *Previous Borrowers:* 7%, 8% or 9% that remain constant	Variable with cap of 12%	5%	Variable	Variable or fixed
Subsidized Interest	Yes, by Federal Government while student is enrolled full-time and during grace periods (6 or 9 months after graduation)	No	Yes, similar to Stafford/GSL	No	No
Fees	5% Origination Fee. Insurance Fee varies with guarantee state	About 2%	None	About 7%	About 4%
Annual Limit	$7,500	$4,000	$4,000 - $6,000 as determined by Financial Aid Office	$12,500	$7,500 - $20,000
Aggregate Maximum	$54,750	$20,000	$18,000	$50,000	$20,000 - $80,000
Eligibility	Determined by Financial Aid Office	Initial determination by Financial Aid Office; Credit reviewed by lenders	Determined by Financial Aid Office based on financial need	Undetermined	Credit worthiness; Review of debt/income ratio for SHARE
Lender	Harvard University or outside lender.	Harvard University or outside lender	Harvard University	Undetermined	Outside lenders
Source	Federal Title IV	Federal Title IV	Federal Title IV	Department of Health and Human Services	Private

Applying for Financial Aid (US Citizens and Permanent Residents)

Documents Applicants who would like to be considered for grants, loans or College Work-Study, must submit the following materials to the Financial Aid Office, Room G-4G, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-432-1867). *Please note that sending any of these documents to any other office will delay the processing of the application:*

1. Harvard School of Public Health (HSPH) Application for Financial Assistance for 1993-94

2. Completed and processed Financial Aid Form (FAF) for 1993-94 (To receive an FAF, check box at the bottom of the HSPH Application for Financial Assistance). The FAF must be completed and sent to the College Scholarship Service (CSS) with appropriate fee and the HSPH code of 3038. CSS takes four to six weeks to process the FAF.

3. A copy of 1992 federal income tax return with schedules, or a non-filer statement.

4. A permanent resident must submit a copy of his/her alien registration card.

Deadline The Financial Aid Application deadline is February 1, 1993. The HSPH Application for Financial Assistance and processed FAF must be on file in the Financial Aid Office and the FAF must be received by the CSS by that date. (If necessary, tax information may be estimated, return may be submitted later.) Applicants must also be accepted to the School before their financial aid application is reviewed. Applicants should begin the financial aid application process as soon as they begin applying to the school. Funds are extremely limited and while financial aid applications will be accepted after the deadline, no guarantee can be made for availability of grants.

Polices

Contingencies Retention of awards and loans is contingent upon making satisfactory academic progress (the maintenance of at least the minimal acceptable grade point average and the required number of credit units).

Education Loan Defaults Applicants should be aware that HSPH views the issue of defaulted education loans as a very serious matter. According to federal regulations, students in default are ineligible to borrow through any federal education loan program or to participate in the College Work-Study Program. Students are also ineligible to receive any institutional support from HSPH.

Courses of Instruction

In the course listings, course numbers are designated as follows: 100 to 199 indicate undergraduate and graduate courses; 200 to 299 indicate primarily graduate courses; and 300 to 399 indicate graduate courses of reading and research.

The letters "a," "b," "c," "d," "e," "f," and "s" following the course number indicate the period(s) in which a course is given, with "a" denoting first period and "b," second period (fall); "c," third period and "d," fourth period (spring). The letters "e" and "f" indicate supervised special studies or field observations, usually during the one-week period between fall and spring semesters or during the week of spring recess. The letter "s" indicates courses offered in the summer as a part of the Program in Clinical Effectiveness.

The credit assignment is given following the statement of number and length of sessions per week. Credits are assigned on the basis of the total amount of time required by a course, both class time and outside preparation. For example, a full-semester ("ab" or "cd") 5-credit course normally requires 4 to 6 hours of outside effort.

A course title in bold type may be followed by a title and number in roman face (enclosed in parentheses). This indicates that the course is also listed in other Harvard catalogs, such as that of the John F. Kennedy School of Government, and that the course credit is provided through that faculty as well as through the School of Public Health, e.g., ***HPM 248cd*** (KSG-HCR 280).

Every effort is made to ensure that the following list of courses is complete and accurate at the time of publication. However, the school reserves the right to make changes in the courses, instructors, and requirements announced in this Register.

The listing of courses in this Register implies no guarantee that a student will in fact be able to enroll in all courses of interest to that student. The course schedule is arranged insofar as possible to accommodate school and departmental requirements. However, students may encounter scheduling conflicts, particularly with electives and with courses offered. Students should also be aware that they must satisfy any prerequisites listed in a course description before they will be permitted to enroll in that course. Courses may be dropped from the schedule at the discretion of the instructor if fewer than five students enroll.

Interdepartmental Courses

ID 201cd. Biology, Epidemiology, Economics, and Policy (BEEP): Malaria
Lectures, seminars. One 3-hour session each week. 2.5 credits. Dr. Spielman, Dr. Brinkmann. This course is designed to bring a multidisciplinary approach to a major public health problem in international health. Within the context of the biology and epidemiology of malaria, students are exposed to strategies of vector control, chemotherapy, and vaccines from the point of view of social, political, and economic policy. Impacts of programs are evaluated from an international and local perspective utilizing techniques from both the social and biomedical sciences.

ID 211d. Vaccines: Past, Present, and Future
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Essex, Dr. Walsh. This course covers methodology for new vaccine development, human trials, manufacturing and quality control, techniques to ensure appropriate use of vaccines, liability issues, cost-effectiveness analysis, and decision analysis regarding vaccines for future research, development, and distribution.

ID 216d. Health Aspects of Nuclear Weapons and War (HMSC-PMCE 709)
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Forrow (HMS), Dr. Leaf, Dr. Leaning, Dr. McArdle, and other Medical Area faculty. Introduces students to the health aspects of the production and potential use of nuclear weapons including the responsibilities of health professionals in the development of public policy. Course topics include historical background, basic physics of nuclear weapons, biological and ecological effects of radiation, nuclear weapons production cycle, medical and psychosocial effects of nuclear war, civil defense, and the roles of health professionals. Related issues concerning chemical and biological weapons are also discussed. Each student leads a classroom discussion of a specific issue.

ID 220cd. Workshop: The Design and Management of Development Projects (KSG PED-310)
Seminar. Two 1.5-hour sessions each week. 5 credits. Dr. Thomas (KSG). Draws heavily on students' own experience and working knowledge of analytical techniques. Attempts to synthesize practical and educational experience to provide the student with a stronger set of skills for future participation in development programs. Emphasizes both the analysis of issues from a political economy perspective and the practical skills of group work, negotiation, memo writing, and verbal presentation in simulated practical situations. Students are expected to have prior experience in, and career commitment to, the field of development.

ID 223cd. Epidemiology: Field Methods of Developing Countries
Lectures, seminars. Two 2-hour sessions each week. 5 credits. Dr. Brinkmann, Dr. Maguire. Examines the reality of epidemiological field work in developing areas. Participants write a grant application for an epidemiological study using the WHO-TDR format. Topics covered include problem analysis and project planning, study design, sampling methods, data sources, questionnaire design, data collection and the use of computers, nutritional status assessment, rapid evaluation techniques, and health expenditure assessment. Prerequisite: EPI200a or EPI201a; signature of instructor.

ID 227cd. Mathematical Models in Biology
Lectures. One 2-hour session each week. 2.5 credits. Dr. Zelen, Dr. Awerbuch. Examines mathematical models as a basis for analyzing biological phenomena. Applied topics include spread of epidemics with emphasis on vector-borne diseases, compartmental distribution of drugs and toxic substances, carcinogenesis, molecular binding, diffusion bioassays, membrane transport, cell and enzyme kinetics, physiologic scaling, DNA sequencing and protein structures. Methodological topics include curve-fitting, experimental design, and computer simulation. Computer exercises will include curve-fitting, computer simulation, and data analysis. Student presentations include independent construction of a model or a description of one presented in the literature. This is an intermediate-level course for students in laboratory science and biostatistics. Prerequisite: BIO 211cd or DBS-BIO 207cd or signature of instructor.

ID 230b. Health of Community Populations
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Gortmaker, Dr. Wise, Guest Lecturers. Principally targeted for those with interests in biostatistics, epidemiology, health policy, and management. Focuses on the common diseases particularly affecting persons living in poverty or near poverty conditions in urban America. Discusses the impact of socioeconomic, cultural, and environmental factors upon ill health. Provides an overview of the types of data available from which to identify community health problems. Presents and evaluates case studies from local communities. Prerequisite: BIO 200ab or BIO 201ab.

ID 240c. Principles of Injury Control
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Hemenway, Dr. Leiberman, Dr. Graham. This course examines one of our most serious public health problems — intentional and unintentional injury. Provide a framework for examining control options. Discusses and analyzes methods for the evaluation of prevention programs and the determination of the optimal combination of countermeasures. Specific categories of injuries, such as motor vehicle crashes, fires and violence are examined in detail.

ID 250a. Ethical Basis of the Practice of Public Health
Lectures, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Reich, Dr. Roberts. Provides students with a broad overview of some of the main philosophical and moral ideas that are used as a basis for resolving debates of public health policy. Helps students develop their own capacities to analyze, criticize, evaluate, and construct policy-oriented arguments. Prerequisite: Acceptance into the MPH Program or the Department of Health Policy and Management, or signature of instructor.

ID 261cd. Practice of Health Care Management
Seminars. One 2-hour session each week. Field study. Eight hours each week. 5 credits. Dr. Calkins, Dr. Caper. Addresses the professional training needs of MPH students who plan to pursue leadership positions in the private sector. Students define and propose solutions to an important problem confronting an institutional sponsor by applying managerial and analytic techniques developed in the Health Care Management concentration. Students meet individually with advisers from HSPH and their host organization throughout the field placement. Seminars use case studies and readings to explore the practice of health care management. Prerequisite: Acceptance into the MPH concentration in Health Care Management or signature of instructor.

ID 262c. Practice of International Health
Lectures, seminars, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Aitken, Dr. Cash, Dr. Herrera, Dr. Brinkmann. Addresses practical issues in planning and implementing programs aimed at particular health programs in developing countries. Students use data sets on selected priority health problems to learn how to make a clear community diagnosis, to select appropriate control strategies, and to plan the implementation of treatment and preventive care programs at the community level. Prerequisite: Acceptance into the MPH concentration in International Health or signature of instructor.

ID 263b. Practice of Occupational Health
Lectures. Two 2-hour sessions each week. 2.5 credits. Mr. Sherwood, Dr. R. Goldman, Dr. Scalnick, Prof. Burgess. Focuses on the assessment of workplace hazards, the physiology and biomechanical aspects of work, and a practical problem-solving approach to health problems in various work settings. Case studies and walk-through field trips to local industries complement didactic material. Emphasizes the relationship between working conditions and health, with special reference to the recognition, measurement, and control of industrial hazards. Prerequisite: EH 262a desirable.

ID 263c. Practice of Occupational Health
Lectures, Two 2-hour sessions each week. 2.5 credits. Prof. Sherwood, Prof. Burgess. This develops and extends the techniques learned in ID 263b by a series of lectures on hazardous processes and related visits to workplaces, including less traditional industries such as nuclear power and hospital services. Students are required to prepare reports on key visits and should become skilled in identifying and visually assessing hazards, and in reporting their findings and recommendations to managements. Prerequesite: ID 263b, (EH262a desirable).

ID 264cd. Practice of Public Management and Community Health
Seminars. One 2-hour session each week. Field study. Eight hours each week. 5 credits. Dr. Calkins, Dr. Gardner, Dr. Deykin, Dr. Peterson, Dr. Prothrow-Stith. Addresses the professional training needs of MPH students who plan to pursue leadership positions in the public sector or in community health. Students undertake field work in public or community health agencies. They apply managerial and analytic techniques developed in the Public Management and Community Health concentration to the solution of problems confronting these agencies. Students meet individually with advisers from HSPH and their host agency throughout the field placement. Seminars explore the practice of public management and community health through case studies and readings. Prerequisite: Acceptance into the MPH concentration in Public Management and Community Health or signature of instructor.

ID 265b. Practice of Quantitative Methods I
ID 266c. Practice of Quantitative Methods II
Seminars, case studies. Two 2-hour sessions each week. 2.5 credits each period. Dr. Ware, Dr. Monson. Addresses practical and conceptual issues in the application of quantitative methods to health evaluation through discussion of current issues in quantitative health research. Students design studies to address important health problems. Relevant topics in behavioral sciences, health policy, and environmental health are highlighted. Prerequisite: Acceptance into the MPH concentration in Quantitative Methods or signature of instructor. ID265b is a prerequisite for ID266c.

ID 330f. Field Trip
Three-day period between "c" and "d" periods. 1 credit. Dr. Hemenway. Centers for Disease Control, Atlanta, Georgia. The Centers for Disease Control (CDC) is a unique institution with many public health functions relevant to the educational and research interests of domestic and foreign students. This field trip will give students an overview of the activities of the CDC, as well as an opportunity to meet individually with professional staff. Lectures and tutorials relate to the various disciplines at CDC, including occupational diseases, surveillance systems, epidemiology, control measures for both chronic and infectious diseases, and CDC's role in international health. Other topics are arranged depending on the interests of the group. A brief paper on the material covered is required of each student.

Biostatistics

BIO 112a. Computing Principles and Methods I
Lectures, discussions. Two 1.5-hour sessions each week. One 1.5-hour laboratory session each week. 2.5 credits. Dr. Pagano, Dr. Fenton. Introductory course is designed to provide basic computer literacy to students from all disciplines. Topics include: computer terminology, organization, capabilities and limitations of computers, programming principles, database management, telecommunications, and data analysis software.

BIO 113b. Introduction to SAS
Lectures. Two 2-hour sessions each week. One 2-hour laboratory session each week. 2.5 credits. Dr. Pagano, Dr. Fenton. Provides intensive instruction in the use of SAS for statistical analysis, database management, and computer programming. Basic issues in each of these areas are discussed in the context of teaching the specific skills required to use SAS effectively. Enrollment limited to 25 students. Prerequisite: BIO 112 or equivalent; signature of instructor.

BIO 113e. Introduction to SAS
Lectures, discussions. Four 2-hour sessions. Four 3-hour laboratory sessions. 1.25 credits. Dr. Pagano, Dr. Hunt. Provides instruction in the use of SAS for statistical analysis, database management, graphics, and computer programming. Basic issues in each of these areas are discussed in the context of teaching the specific skills required to use SAS on personal computers. Enrollment limited to 25 students. Prerequisite: BIO 112 or equivalent; signature of instructor. Credit is given for only one section of BIO 113: b or e.

BIO 200ab. Introduction to Statistical Methods
Lectures, discussions. Two 1.5-hour sessions each week. One 1-hour laboratory session each week. 5 credits. Dr. Testa. Covers basic statistical techniques which are important for analyzing data arising from epidemiology, environmental health, biomedical and other public health-related research. Topics include: elements of probability, introduction to estimation and inference, distribution-free methods, contingency tables, regression analysis, analysis of variance, and elements of study design. Applications are stressed. Designed as an alternate to BIO 201ab for students desiring more emphasis on theoretical developments or those having had an introductory statistics course at the level of BIO 201ab. Credit is not given for both BIO 200ab and BIO 201ab. Prerequisite: Courses in algebra and calculus.

BIO 201ab. Principles of Biostatistics
Lectures. Two 1-hour sessions each week. One 2-hour laboratory session each week. 5 credits. Dr. Pagano. Lectures and laboratory exercises acquaint the student with the basic concepts of biostatistics and their applications and interpretation. Topics include: descriptive statistics, probability distributions, inference, tests of significance, association, regression, and life tables. Note: Credit is given for only one of these courses: BIO 200ab, BIO 201ab, or BIO-HPM 203b,c,d. This course cannot be counted as part of the credit requirement for a major or minor doctoral field.

BIO-HPM 203b. Statistical Methods for Health Policy and Management (Module I) Dr. Williams
BIO-HPM 203c. Statistical Methods for Health Policy and Management (Module II) Dr. Williams
BIO-HPM 203d. Statistical Methods for Health Policy and Management (Module III) Dr. Spino
Lectures. Two 1.5-hour sessions each week. One 1.5-hour lab session each week. 2.5 credits each period. Introduces students to probability and statistics, emphasizing their application in a variety of health policy and management contexts. Goals include establishing an awareness of basic statistical reasoning and understanding of common difficulties in application. The STATA package is used throughout. Module I(b): Topics include: descriptive statistics, probability and probability distributions, sampling distributions, experimental design and sampling methods, confidence intervals, hypothesis testing, and p-values. Module II(c): Topics include: power, sample size determination, non-parametric methods, analysis of categorical data, introduction to simple linear regression. Module III(d): Topics include: correlation, simple linear regression, analysis of variance, multiple regression, and introduction to time series and logistic regression. Sections are graded separately. May not be taken for credit by students who have previously taken BIO 200ab or BIO 201ab. If substituted for BIO 200ab or BIO 201ab, all three modules must be taken. Prerequisite: One college-level course in mathematics. Enrollment of students not in the Department of Health Policy and Management requires the signature of instructor.

BIO 204ab. Biostatistics for Medical Investigators
Lectures. One 2-hour session each week. 2.5 credits. Dr. Gelman. This course is aimed at fellows, residents, and clinical investigators. Topics include: diagnostic test analysis (sensitivity, specificity, ROC curves, Bayes Theorem), risk of disease (prevalence, incidence, cohort studies, case control studies), treatment effects (summary statistics, single-paired, and two-sample tests, analysis of proportions, survival data), models (linear, logistic, proportional hazards), and clinical trials (randomization, stratification, eligibility, blinding, interpretation).

BIO 206s. Statistical Principles in Medical Research
Lectures. Five 1.75-hour sessions each week for seven weeks. 5 credits. Dr. Orav. Designed primarily for participants in the Training Program in Clinical Effectiveness. Topics include: concepts in probability and statistics, hypothesis testing, non-parametrics, discrete data analysis, regression and analysis of variance. Emphasis is on allowing participants to think about issues in designing and analyzing studies. Theoretical issues are not pursued in depth. Prerequisite: Acceptance into the Program in Clinical Effectiveness. Instruction and additional labs for the SAS package are provided.

DBS-BIO 207cd. Statistical Methods in Biology
Lectures, laboratory. Two 2-hour sessions each week. 5 credits. Dr. Propert. (Course described under the Division of Biological Sciences.)

BIO 210cd. The Analysis of Rates and Proportions
Lectures. Two 1.5-hour sessions each week. One 1-hour laboratory session each week. 5 credits. Dr. Wypij. Emphasizes concepts and methods for analysis of data which are categorical, rate-of-occurrence (e.g., incidence rate), and time-to-event (survival duration). Stresses applications in epidemiology, clinical trials, and other public health research. Topics include: measures of association, 2x2 tables, stratification, logistic regression, matched pairs, analysis of rates, and survival data analysis using proportional hazards models. Prerequisite: BIO 200ab or BIO 201ab or equivalent.

BIO 211cd. Regression and Analysis of Variance in Experimental Research
Lectures. Two 1.5-hour sessions each week. One 1-hour laboratory session each week. 5 credits. Dr. Hughes. Covers analysis of variance and regression, including details of data-analytic techniques and implications for experimental design. Also included are probability models and computing. Students learn to formulate a scientific question in terms of a statistical model, leading to objective and quantitative answers. Prerequisite: BIO 200ab or BIO 201ab or equivalent.

BIO 212cd. Survey Research Methods in Community Health
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Laird, Dr. Mangione. Covers research design, sample selection, questionnaire construction, interviewing techniques, the reduction and interpretation of data, and related facets of population survey investigations. Focuses primarily on the application of survey methods to problems of health program planning and evaluation. Treatment of methodology is sufficiently broad to be suitable for students who are concerned with epidemiological, nutritional, or other types of survey research.

BIO 214c. Principles of Clinical Trials
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Gelber, Dr. Stanley. Designed for individuals interested in the scientific, policy, and management aspects of clinical trials. Topics include: types of clinical research, study design, treatment allocation, randomization and stratification, quality control, sample size requirements, patient consent, and interpretation of results. Students design a clinical investigation in their own field of interest, write a protocol for it, and write essays critiquing recently-published medical literature. Prerequisite: An introductory statistics course.

BIO 216cd. Applied Survival Analysis
Lectures. Two 1.5-hour sessions each week. 5 credits. Dr. Kalish. This is an applied course for those wishing to learn about modern developments in the practice of survival methods. Topics include: parametric distributions (exponential, Weibull), role of the hazard function, estimation of survival distributions using life table and maximum likelihood methods, two-population problems, proportional hazard models and regression, tests of proportional hazard assumption, and software for implementing testing and estimation procedures. Emphasis is on practical experience in survival data analysis. Prerequisite: BIO 210cd, BIO 220ab, or BIO 221cd.

BIO 217ab. Statistical Computing
Lectures. Two 1.5-hour sessions each week. One1.5-hour laboratory session each week. 5 credits. Dr. Spino, Dr. Gonin. An intermediate-level course introducing students to some computer-intensive methods useful in biostatistical applications hardware, systems software, and biostatistical applications software. Most of the course time is spent learning fundamental ideas and algorithms involved with numerical analysis, matrix operations, simulation, and optimization. Implementation of selected frequently-used techniques, such as nonlinear regression, maximum likelihood estimation, or exact tests is discussed. Prerequisite: A course in biostatistics or statistics. Knowledge of a programming language or signature of instructor.

BIO 220ab. Introduction to Statistical Modeling and Data Analysis
Lectures, discussions. Two 2 hour sessions each week. 5 credits. Dr. L. Ryan. An introductory but fast-paced course in statistical methods for data analysis. Topics include: statistical inference, the analysis of normally distributed data (including linear regression models and ANOVA), distribution free methods, discrete data methods (including logistic and Poisson regression techniques). Emphasizes the use of likelihood based modelling and inference. Prerequisite: Open to first year Biostatistics majors and second year students from other departments, so long as they are proficient in basic calculus and linear algebra. Students not meeting these requirements may enter with permission of the instructor.

BIO 221cd. Discrete Multivariate Analysis
Lectures. Two 1.5-hour sessions each week. One 1.5-hour (optional) laboratory session each week. 5 credits. Dr. Lagakos. Deals with the use of statistical models for analyzing count data. Emphasizes practical application rather than mathematical theory. Extensive use is made of computer packages for data analysis. Topics include: the analysis of contingency tables, chi-square and exact tests, measures of association, logistic regression, log linear analysis using iterative proportional fitting and the binomial, multinominal, and Poisson distributions. Prerequisite: BIO 210cd, BIO 220ab, or equivalent, or signature of instructor.

BIO 230ab. Probability Theory and Applications
Lectures. Two 1.5-hour sessions each week. Two 1-hour laboratory sessions each week. 5 credits. Dr. Orav. A course in probability theory fundamental to the statistics program. Topics include: axiomatic foundations, combinatorial probability, discrete and continuous sample spaces, conditional probability and independence, random variables, generating functions and characteristic functions, standard distributions, expectation and variance operators, transformations, convergence concepts, strong and weak laws, central limit theorems, and stochastic processes. Prerequisite: Intermediate calculus (one or two semesters beyond elementary calculus).

BIO 231cd. Statistical Inference I
Lectures. Two 1.5-hour sessions each week. One 1.5-hour laboratory session each week. 5 credits. Dr. Lefkopoulou. A fundamental course in statistical inference. Discusses general principles of data reduction: exponential families, sufficiency, ancillarity and completeness. Describes general methods of point and interval parameter estimation and the small and large sample properties of estimators: method of moments, maximum likelihood, unbiased estimation, Rao-Blackwell and Lehman-Scheffe theorems, information inequality, asymptotic relative efficiency of estimators. Describes general methods of hypothesis testing and optimality properties of tests: Neyman-Pearson theory, likelihood ratio tests, score and Wald tests, uniformally and locally most powerful tests, asymptotic relative efficiency of tests. Prerequisite: BIO 230ab or equivalent.

BIO 235ab. Regression and Analysis of Variance
Lectures. Two 1.5-hour sessions each week. One 2-hour laboratory session each week. 5 credits. Dr. DeGruttola. Describes general procedures of estimation and hypothesis testing for linear models: least squares and maximum likelihood estimation, Cochran's theorem, Gauss-Markov theorem, estimable functions, multivariate normal distribution, and simultaneous inference. Discusses techniques of analysis of variance and experimental design: partitioning sum of squares, factorial experiments, nested designs, analysis of covariance, and repeated measures. Prerequisite: BIO 231cd or equivalent; familiarity with matrix algebra. BIO 211cd or equivalent recommended.

BIO 236ab. Analysis of Failure Time Data
Lectures. Two 2-hour sessions each week. 5 credits. Dr. D. Harrington. Discusses the theoretical basis of concepts and methodologies associated with survival data and censoring, nonparametric tests, and competing risk models. Much of the theory is developed using counting processes and martingale methods. Material is drawn from recent literature. Prerequisite: BIO 221cd and BIO 231cd.

BIO 245cd. Analysis of Multivariate and Longitudinal Data
Not to be given 1992-93; offered alternate years. Lectures, discussions. Two 2-hour sessions each week. 5 credits. Dr. Laird. Presents classical and modern approaches to the analysis of multivariate observations, repeated measures, and longitudinal data. Topics include: the multivariate normal distribution, estimation of the mean and covariance matrix, Hotellings T2, MANOVA, the multivariate linear model, random effects and growth curve models, statistical analysis of categorical outcomes, and estimation with missing data. Presents estimating equations and generalized normal models as extension of the normal theory. Discusses computational issues for both traditional and new methodologies. Prerequisite: BIO 231cd and BIO 235ab.

BIO 246cd. Generalized Linear Models
To be given 1992-93; offered alternate years. Lectures. Two 2-hour sessions each week. One 1-hour laboratory session each week. 5 credits. Dr. Tsiatis. Studies generalized linear models, as well as models with generalized variance structure. Parametric models include exponential families such as normal, Binomial, Poisson, and Gamma. Iterative reweighted least squares and quasi-likelihood methods are used for estimation of parameters as well as generalized estimating equations and quadratic estimating equations. Methods are extended to problems where no distributional assumptions are made about the errors except for the structure of the first two moments. Recent methods in the field are also studied. Prerequisite: BIO 230ab, BIO 231cd, and BIO 235ab.

BIO 247cd. Design of Scientific Investigations
To be given 1992-93; offered alternate years. Lectures. Two 2 hour sessions each week. 5 credits. Dr. Zelen. Discusses those aspects of statistical theory and practice relevant to the design of scientific investigations in the health sciences. Topics include: sample size considerations; basic principles of experimental design (randomization, replication, and balance); fixed, mixed, and random models; clinical trials; block designs; two-way elimination designs; factorial experiments; analysis of covariance; longitudinal and observational studies. Prerequisite: BIO 235ab or signature of instructor.

BIO 251cd. Statistical Inference II
Lectures. Two 1.5-hour sessions each week. 5 credits. Dr. Rotnitzky. Sequel to BIO 231cd. Considers two principal topics: asymptotic theory, and theories of optimality. The asymptotics module includes limit theorems, multivariate delta method, properties of maximum likelihood estimates, semi-parametric efficient estimation, asymptotic relative efficiency, and hypothesis tests. The theories of optimality module discusses invariance, minimaxity, and Bayesian inference. Prerequisite: BIO 231cd.

BIO 261-269. Topics in Biostatistics
Offered primarily for students majoring in biostatistics or epidemiology, although qualified students from other departments are welcome. Topics covered vary each year, based on recent developments in biostatistics and the research interests of instructor.

BIO 262ab. Applied Multivariate Analysis for Clinical Research
Lectures. Two 1.5-hour sessions each week. One 1.5-hour laboratory session each week. 5 credits. Dr. Orav. This course will introduce students involved with clinical research to the practical application of multivariate analyses. Multiple regression, logistic regression and proportional hazards survival models will be covered, as well as general concepts in model selection, goodness-of-fit, and testing procedures. Each lecture will be accompanied by a data analysis, and a classroom discussion of the results. Little attention will be given to the underlying theoretical basis for the methods of estimation and testing. NOTE: Candidates for SM or SD majoring in Biostatistics may not receive credit for this course. Prerequisite: Proficiency in simple linear regression, ANOVA, and either SAS or STATA; signature of instructor.

BIO 263cd. Exact Nonparametric Inference
Not to be given 1992-93; offered alternate years. Lectures. One 1.5-hour session each week. 2.5 credits. Dr. Mehta. This course will introduce modern algorithms for exact nonparametric inference through specific examples, including ordered or unordered contingency tables, linear rank tests, multivariate rank tests, logistic regression, and group-sequential designs. The basic techniques utilized by these algorithms are recursion, network and graph theory, dynamic programming, and Monte Carlo variance reduction. Computer support for the course will be provided by the StatXact software package. Prerequisite: Probability and inference; knowledge of FORTRAN, C, or PASCAL.

BIO 266ab. Exploratory Data Analysis and Smoothing Techniques Using "S"
Lectures. One 2-hour session each week. 2.5 credits. Dr. Gray, Dr. Propert. This course is designed to give training in data analysis. Emphasis is given to exploratory data analysis (EDA) methods over hypothesis testing. Topics include: nonparametric measures of location and scale, data transformations, scatterplot smoothers and nonparametric modeling, analysis of residuals in linear and generalized linear models, case influence diagnostics, and methods of model selection. The S language will be used for data analysis. Prerequisite: BIO 235ab (may be taken concurrently), knowledge of a programming language.

BIO 267ab. Topics in Discrete Data Analysis
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Wypij, Dr. Lipsitz. This course will cover various advanced techniques for the analysis of discrete data. Topics include: decision theoretic, Bayes, and empirical Bayes estimation with multinomial and Poisson responses, contingency tables, and logistic regression; advanced topics in logistic regression including the estimation of percentiles, alternative link functions, and extensions to ordered or unordered multinomial responses; models for joint distributions, including repeated measure; and methods for the analysis of missing data, including the EM algorithm. Prerequisite: BIO 221cd and BIO 231cd or signature of instructor.

BIO 268cd. Statistical Methods in AIDS Research
Lectures. One 1.5-hour session each week. 2.5 credits. Dr. Amato. This course will review innovative statistical methods used in AIDS research, emphasizing those used in epidemiological investigations and in the design, conduct, and analysis of randomized clinical trials. The format will consist of lectures, primarily by guest faculty, on recent work in the field. Topics include: an introduction to the biology of HIV disease, estimating disease transition rates, mathematical models for the epidemic, modeling CD4 changes over time, and design issues in perinatal transmission studies. Prerequisite: BIO 216cd and BIO 231cd.

BIO 269cd. Statistical Methods in Psychiatry
Lectures. One 2-hour session each week. 2.5 credits. Dr. Waternaux. This course is designed to give students an overview of principles of design and data-analytic methods especially relevant to psychiatric research. Topics include: an overview of the Diagnostic and Statistical Manual of Mental Disorders, (third edition); classification of mental disorders, psychiatric rating scales, assessment of inter-rater reliability, Cohen's Kappa statistics, design and analysis of clinical trials in psychiatry research, lifetable and survival analysis methods, and analysis of repeated measures experiments. Prerequisite: Two Biostatistics courses at 200 level other than introductory courses; signature of instructor.

BIO 270cd. Statistical Science Outreach
Discussions, seminars. One 2-hour session each week. 2.5 credits. Dr. Zelen, Dr. Wei. This is a seminar aimed at broadening the background of students in probability and statistics. Students will be expected to present short presentations from expository articles and papers. Articles will be chosen on the basis of ideas rather than technical content. There will be some emphasis on historical developments. Note: This class cannot be used to satisfy the intermediate requirement in biostatistics for doctoral students. Prerequisite: Enrollment in a biostatistics degree program or signature of instructor.

HPM-BIO 280b. Decision Analysis for Health and Medical Practices
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Weinstein. (Course described under Health Policy and Management.)

HPM-BIO 281c. Seminar on Clinical Decision Analysis
Seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Weinstein. (Course described under Health Policy and Management.)

HPM-BIO 282d. Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation
Seminars, lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Graham, Dr. Johannesson. (Course described under Health Policy and Management.)

HPM-BIO 284ab. Topics in Health Decisions Sciences
Not to be given 1992-93; offered alternate years. Lectures, seminars. One 2-hour session each week. 2.5 credits. Instructor to be arranged. (Course described under Health Policy and Management.)

EH-BIO 290cd. Causal Inference from Observational Data
Lectures. One 3.5-hour session each week. 5 credits. Dr. Robins. (Course described under Environmental Health.)

BIO 310-315abcd. Tutorial Programs
Time and credit to be arranged. An opportunity for tutorial work is offered for interested and qualified students or small groups of students. Arrangements must be made with individual faculty members and are limited by the amount of faculty time available. These programs are open to students specializing in biostatistics and also to students in other fields who wish to go beyond the content of the regular courses. Six broad categories of this tutorial instruction are identified by the course numbers below:

BIO 310. Statistical Methods
Guided study in specific areas of statistical methodology and applications.

BIO 311. Teaching
Work with members of the department in laboratory instruction and the development of teaching materials.

BIO 312. Consultation
Work with members of the department on current statistical consultation activities.

BIO 313. Computing
Guided study in scientific programming, numerical methods, and data management.

BIO 314. Study Design
Guidance in developing statistical design of a study in which the student has a particular interest.

BIO 315. Data Analysis
Guidance in the statistical analysis of a body of data in which the student is interested.

Students may register for BIO 310-315 for a maximum of 5 credits in the summer term.

BIO 350. Research
Candidates for the Doctor of Public Health or Doctor of Science degree may arrange for individual research. The work may be part of the program for a doctorate in this department or may be integrated with doctoral research in other departments.

Cancer Biology

CB 204ab. Immunobiology
To be given 1992-93; offered alternate years. Lectures. One 1.5-hour session each week and 1 hour DMS Weekly Immunology Seminar Series. 5 credits. Dr. Glimcher, Faculty and Guest Lecturers. Examines the anatomy and physiology of the immune system, fate of antigen, cell trafficking, cellular interactions, and regulation of the immune response, and B and T cell recognition mechanisms. Principles of immunoregulation are discussed in the context of current literature. Grade is based on class participation and a paper. Enrollment limited to 20 students. Prerequisite: Basic course in microbiology and immunology; signature of the instructor.

CB 207ab. Radiation Biology
Not to be given in 1992-93; offered alternate years. Lectures. Three 1-hour sessions each week. 5 credits. Dr. Little. Examines the biological effects of ionizing radiation, particularly as radiation serves as a model for the genotoxic and carcinogenic effects of environmental chemicals. The first period covers cellular and molecular processes including cell killing, mutagenesis, malignant transformation and chromosomal changes. The second covers effects in humans including the acute radiation syndrome, teratogenic, developmental and genetic effects, and the characteristics of external and internal exposures. Discussion of the human epidemiologic data for radiation carcinogenesis and their use risk in analysis emphasized. Prerequisite: College-level course in biology.

CB 212ab. Introduction to Cancer Biology
To be given 1992-93; offered alternate years. Lectures, discussions. Two 1.5-hour sessions each week. 5 credits. Dr. Liber, Dr. Kelsey, Guest Lecturers. Emphasizes current experimental approaches to studying cancer biology and the process of carcinogenesis. Topics include the biology of cell modification and differentiation, the phenotype of the cancer cell, the properties of human and animal cancers, the process of cell transformation, mutagenesis, carcinogen metabolism and the general features of cancer epidemiology, and what these say about the causes of human cancer. Early in the course, several introductory lectures are given to cover basic concepts of genetics, cell biology, and molecular biology. Prerequisite: College-level course in biology.

CB 222d. The AIDS Epidemic: Status, Dynamics, Prospects, Conflicts
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Kanki, Dr. Essex. Deals with a broad range of topics relating to the public health implications of the AIDS epidemic, including the virology, therapy, and etiologic hypotheses concerning the origins of the virus. Topics for discussion and review include the dynamics of the epidemic, public policy issues relevant to measures to reduce the spread of infection, economic implications, and social support needs of affected persons. Course will not be given if fewer than 8 students enroll. Prerequisite: Knowledge of virology or clinical medicine helpful.

CB 224cd. The AIDS Virus
Two 2-hour sessions each week. 5 credits. Dr. Haseltine. Provides students with a basic understanding of the biology of the AIDS virus as well as molecular properties of this virus. Covers areas such as initiation of infection, reverse transcriptase, integration, transcription integration, principles of virus particle assembly, immunology, and drug and vaccine development. Prerequisite: Signature of the instructor.

CB 302-308abcd. Tutorial Programs
Time and credit to be arranged. Enrollment requires the consent of the staff member responsible for supervision of the research. The various subject areas are listed below by category:

CB 302. Viruses
Dr. Essex, Dr. Haseltine. Isolation and identification of representative viruses by use of cell culture, animal inoculation, and serologic and molecular techniques.

CB 303. Immunochemical Methods
Dr. Essex, Members of the Department. Covers the methodology of immunofluorescence, enzyme-linked immunoassays, 51 Cr release, chromatography, immunoelectrophoresis, monoclonal antibodies as applied to oncogenesis, and resistance to infectious viral agents.

CB 304. Public Health Laboratory
Associates at the State Laboratory Institute. The State Laboratory Institute is engaged in a variety of programs related to public health. These include: the development, preparation, and testing of new and standard serums, vaccines, and blood fractions; research in various aspects of applied immunology; various aspects of diagnostic service in the fields of bacteriology, virology, and congenital metabolic disorders; and field studies on arboviruses. Individual arrangements for study can be made in any of these programs.

CB 305. Tumor Biology
Members of the Department. Approaches and techniques for the study of cancer as an infectious disease. Procedures used to study tumor cell and tumor virus marker antigens and antibodies demonstrated. The significance of these markers for epidemiological, etiological, and diagnostic investigations of various tumor systems of known and unknown causes are discussed. The relationship between the immune response and the oncogenic process are examined.

CB 306. Cellular Immunology and Molecular Biology of the Immune System
Dr. Glimcher. Examines the events following immunization of infection where the quality and quantity of the immune response is regulated by subsets or lymphocytes and their products. The mechanism of this regulation is explored by analyzing immunologic circuits, idiotypic recognition, and antibody and cell-mediated cytotoxicity.

CB 307. Radiobiology
Dr. Little. Current topics in radiobiology at molecular, cellular, and organismal levels. Cytotoxic, mutagenic, and carcinogenic consequences of ionizing and nonionizing radiations are examined, with emphasis on genetic, physiologic, and environmental factors that modify these biological effects.

CB 308. Chemical Carcinogenesis
Dr. Haseltine. Methodology and interpretation of tests for chemical carcinogens, mutagenesis and repair of DNA, and the time course of the formation of cancer.

CB 350. Research
Qualified doctoral candidates, research fellows, and full-time special students may register for CB 350 to undertake original research in virology, bacteriology, immunology, or in one of the disciplines available at the State Laboratory Institute. A number of the current research activities of the department are listed under CB 302-308. Inquiries about specific research opportunities should be addressed to the chair of the department.

Division of Biological Sciences

DBS 205ab, 205cd. Interdepartmental Seminar in the Biological Sciences
Lectures, discussions. One 3-hour session in alternate weeks. 2.5 credits each semester. Dr. Samson, Dr. Warner. HSPH faculty present seminars on their current research in the biological sciences and direct a student discussion of the logic and experimental design of this research. Topics include chemical and viral carcinogenesis, DNA damage and repair, immunology, molecular biology, radiobiology, respiratory biology, and virology. In the "ab" semester, the course runs in alternate weeks opposite DBS 206ab. Required for first-year students in the Division of Biological Sciences.

DBS 206ab. Papers in the Biological Sciences: Past and Present
Discussions. One 3-hour session in alternate weeks. 2.5 credits. Dr. Samson. Students and faculty discuss "classic" papers in biology from the perspective of their logic and experimental design rather than their factual content. The course is intended to provoke in-depth discussion and assessment of biochemical, physical, and genetic methods employed in testing hypotheses. The course runs in alternate weeks opposite DBS 205ab. Required for first-year students in the Division of Biological Sciences. Prerequisite: Signature of instructor.

DBS-BIO 207cd. Statistical Methods in Biology
Lectures. Two 2-hour sessions each week. Laboratory. To be arranged. 5 credits. Dr. Propert. Designed to familiarize students with the statistical methods used in laboratory research for design of experiments and statistical analyses of hypotheses. Topics include basic theory of probability and statistics, analysis of continuous and categorical data, ANOVA and multiple regression, and nonparametric methods. Examples will focus on statistical problems encountered in laboratory research.

DBS 210cd. Molecular Mechanisms of Immune Control
Seminar. One 2-hour session each week. 5 credits. Dr. Boothby, Guest Lecturers. Topics include control of gene expression (transcriptional, post-transcriptional, translation, protein sorting and stability, recombination), lentivirus "unique" strategies, cell activation and cell death. Course objectives are student mastery of primary literature on molecular control (the immune system as a convenient unifying theme) and the development of reading, data analysis, and oral presentation skills. Includes seminar presentations by students and submission of term paper. Prerequisite: Basic molecular and cellular biology and basic immunology.

DBS-EH 221b. Methods in Cell Biology
To be given 1992-93; offered alternate years. Lectures, discussions, demonstrations. Two 2-hour sessions each week. 2.5 credits. Dr. Kobzik, Dr. Warner, Members of the Division of Biological Sciences, Guest Lecturers. Provides an overview of experimental approaches in cell biology that are useful for studying cell structure and function. The goal is to appreciate how our view of cell biology is shaped by the methods we have available to examine cells. Techniques such as electron microscopy, morphometry, protein fractionation, markers (fluorescent, immune, radioactive), molecular biology, cell cycle analysis, quantitative light microscopy, and others are presented along with integrative material on the relationship of cell biology to evaluation of cell function and injury.

DBS 225cd. Applied Molecular Biology
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Shoemaker. This course teaches the theoretical and practical aspects underlying molecular biology technologies. Course material will include a detailed conceptual description of the various technologies, how the different procedures can work together to solve research problems, possible short cuts to employ and pitfalls to avoid. The goal is to provide researchers with the basis from which to most effectively incorporate molecular biology technology into their research programs. Prerequisite: Signature of instructor; basic cell and/or molecular biology course work.

DBS 300ab, 300cd. Laboratory Rotations
Laboratory. 12-20 hours each week. 5 credits each semester. Director, Members of the Division of Biological Sciences. Offers hands-ons experimental methods of research in the biological sciences. Consists of individual original laboratory work. Includes participation in seminars, journal clubs, and assigned readings. Prerequisite: Signature of the instructor.

DBS 301. Contemporary Papers in Biology
Time to be arranged, 1.25 credits per semester. Dr. Samuelson. Journal club designed to provide the opportunity to analyze and present information on a broad range of topics in the literature. For each session, a student will choose one or two recent journal articles which will be read and discussed by the group. First year students in the Division of Biological Sciences strongly encouraged to attend.

Environmental Health

EH 201c. Principles of Environmental Health I
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Moeller. Represents a first step in a review of the more important environmental health problems facing society. Topics include environmental physiology, radiation protection, community air pollution, occupational health, and municipal water purification and wastewater treatment. Submission of a term paper is required.

EH 202d. Principles of Environmental Health II
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Moeller. Represents a continuation in the review of the more important environmental health problems facing society. Topics include: energy and the environment, environmental toxicology and hazardous waste management, environmental law and economics, accidents and public health, insect and rodent control, and environmental monitoring. Submission of a term paper is required.

EH 203c. Principles of Environmental Health III
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Moeller. Emphasizes environmental health problems in developing countries. Topics include: individual household water supplies and wastewater treatment; basic sanitation, insect and rodent control; foodborne diseases, housing and home accidents; operation, maintenance, and management of environmental systems; and selection of appropriate technology for coping with such problems. Submission of a term paper is required.

TOX-EH 204ab. Principles of Toxicology (HMS BCMP 713, FAS BCMP 218)
Lectures, seminars. Two 2-hour sessions each week. One 2-hour (optional) discussion sessions each week. 5 credits. Dr. Farr, Dr. Milton. (Course described under Toxicology.)

EH 205ab. Human Physiology
Lectures, conferences, demonstrations. Two 1-hour sessions and one 2-hour session each week. 5 credits. Dr. Banzett, Members of the Respiratory Biology Program. Students, including those lacking a background in biology, are offered an intensive introduction to biological principles and to the physiology of cells, organs systems, and organisms. Some pathophysiology and several laboratory exercises are included. Prerequisite: Students without college courses in physics, chemistry, and mathematics should speak with the instructor beforehand.

EPI-EH 215cd. Environmental and Occupational Epidemiology
Lectures, seminars. One 2-hour session each week. 2.5 credits. Dr. Dockery, Dr. Monson, Dr. Robins. (Course described under Epidemiology.)

DBS-EH 221ab. Methods in Cell Biology
To be given 1992-93; offered alternate years. Lectures, discussions, demonstrations. Two 2-hour sessions each week. 5 credits. Dr. Kobzik, Dr. Warner, Members of the Division of Biological Sciences, Guest Lecturers. (Course described under the Division of Biological Sciences.)

EH 223ab. Advanced Respiratory Physiology
Not given 1992-93; offered alternate years. Lectures, seminars, student presentations. Two 1.5-hour sessions each week. 5 credits. Dr. Shore, Members of the Department. Covers a broad range of topics in respiratory physiology including: airway physiology and pharmacology; host-defense mechanisms; lung endocrine functions; pulmonary circulation; lung, chest wall, and airway mechanics; and ventilation/profusion balance. Reviews classic concepts and presents recent advances. Prerequisite: College-level physiology or EH 205ab or equivalent, or signature of instructor.

EH 225cd. Advanced Topics in Respiratory Biology
Two 1.5-hour sessions each week. 5 credits. Dr. Fredberg, Dr. Loring, Dr. Reid (HMS), Dr. Wohl (HMS). This course provides opportunities for students interested in the respiratory system to focus on a particular aspect of lung biology. The approach is broad emphasizing systems and integrated physiology, anatomy at the gross and ultrastructural level, and cell and molecular biology. The phenomenology of mechanisms of normal and abnormal lung growth will be described. Students will explore one particular aspect of lung growth, repair, or adaptation and write a major research paper. Prerequisite: Signature of instructor; EH 223 "Advanced Respiratory Physiology" or equivalent.

EH 231cd. Occupational Health Policy and Administration
Seminars. One 2-hour session each week. 1.25 credits. Dr. Nobel, Dr. Hashimoto, Dr. Boden. Examines the legal, economic, and political foundations of occupational health activities in the United States. Discusses the roles of government, unions, corporations, and research organizations. Helps students acquire an understanding of management functions in corporations. Enables students to develop the knowledge and skills in the above areas necessary to apply medical, industrial hygiene, and statistical skills to achieve a healthful workplace. Prerequisite: Non-EH students must have signature of instructor.

EH 232cd. Introduction to Occupational Medicine
Lectures. One 2-hour session each week. 2.5 credits. Dr. Hu, Dr. Christiani. Reviews the diagnosis following exposure to specific workplace substances, including asbestos, lead, organic solvents, and other substances. Considers methods of diagnosis of early organ system effects of chemicals and techniques for assessing disability. Prerequisite: Limited to physicians or others with adequate training.

EH-EPI 235ab. Scientific Basis of Occupational Health Regulations
Seminars. One 3-hour sessions each week. 5 credits. Dr. Monson, Dr. Eisen, Dr. Wegman. Provides students with the opportunity to review the scientific basis for the association of selected occupational exposures and disease. Special emphasis is placed on evaluation of the epidemiologic literature, and on occupational cancer, respiratory disease, and other kinds of occupational morbidity. Attention is directed to the interface of science and regulatory policy and the role of risk analysis in setting health standards. Enrollment limited to 15 students. Prerequisite: EPI 200a or EPI 201a, BIO 200ab or BIO 201ab, ID 263bc; signature of instructor. EPI-EH 215cd is strongly recommended.

EH 237ab. Introduction to Occupational Health Nursing
Not to be given 1992-93. Lectures. One 4-hour session each week. 5 credits. Dr. Monson, Ms. Travers. Covers the fundamental concepts of occupational health and safety relevant to the planning and implementing of targeted programs for workers, and provides a forum for discussion of related social, political, economic, legal, medical, and nursing issues. Topics include environmental determinants of health, factors which promote or inhibit the health of workers, delivery of health services in the work setting, and skills and strategies essential to the development of leadership roles in occupational health nursing.

EH 238ab. Occupational Health Nursing Management
Not to be given 1992-93. Lectures, seminars. One 2-hour session each week. 2.5 credits. Dr. Monson, Ms. Travers. Students apply skills and knowledge and occupational health and safety to the development of appropriate occupational health programs. Includes organizational development, communication skills and techniques for managing change. Note: This is considered an advanced course in occupational nursing. Required for all students in Occupational Health Nursing.

EH 239cd. Case Studies in Occupational Health Nursing
Not to be given 1992-93. Seminars. One 2-hour session each week. 2.5 credits. Dr. Monson, Ms. Travers. Provides a foundation for the development of skills and strategies necessary for program planning and development in occupational health through the critique of case studies of workplace situations and circumstances. Students identify health hazards, review injury/illness data, evaluate existing occupational health programs, and make recommendations. Prepares students for field placement in occupational health nursing.

EH 241cd. Occupational Safety
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Mangone, Dr. Snook. Covers the principles of occupational safety. Topics include: growth of the field of occupational safety; safety regulation and standards; theoretical models of accident causation; accident investigation procedures; and engineering, behavioral, and administrative techniques for accident control. Builds toward the development and validation of prescriptive systems for the alleviation of workplace hazards.

EH 243ab. Ergonomics/Human Factors
Lectures, demonstrations. One 2-hour session each week. 2.5 credits. Dr. Snook, Dr. Ciriello. Emphasizes the design of the job to fit the worker. Specific problems are investigated which result from the nature of the job itself, e.g., low back disorders, fatigue, cumulative trauma disorders, slips and falls, and human error. The physiological, biomedical, psychological, and anatomical characteristics of the worker are considered in the development of good job design principles.

EH 253c. Environmental Control I: Ventilation in the Workplace (One half of ENG SCI 270)
Lectures. Two 2-hour sessions each week. Laboratory. Six 1.5-hour sessions. Field trips. Five 2-4 hour sessions. 2.5 credits. Dr. Rudnick, Mr. DiBerardinis, Prof. Burgess. This course covers the fundamentals and application of industrial ventilation as a means of controlling workers' exposure to particulate and gaseous air contaminants. Note: EH 253c and EH253d taken together are ENG SCI 270 in the Graduate School of Arts and Sciences.

EH 254d. Environmental Control II: Physical Stresses in the Workplace (One half of ENG SCI 270)
Lectures. Two 2-hour sessions each week. Laboratory. Four 1.5-hour sessions. Field Trips. Two 3-4 hour sessions. 2.5 credits. Dr. Rudnick, Prof. Sherwood. This course covers the fundamentals, evaluation, and control of (1) noise and vibration and (2) heat stress; and (3) the application of respiratory protective equipment.

EH-HPM 260cd. Fundamentals of Exposure and Risk Assessment
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Evans, Dr. Graham, Dr. P.B. Ryan. Covers principles of exposure and risk assessment; introduces basic methods for monitoring and modeling the concentration of pollutants in the environment; distinguishes concentration, exposure, and dose; describes hazard identification, dose-response evaluation, and risk characterization as elements in risk assessment; considers methods for error analysis and computation of the value of improved information. Required for concentrators in environmental management. Prerequisite: Calculus and chemistry.

EH 261ab. Properties of Environmental Contaminants
Lectures. Two 2-hour sessions each week. Two 4-hour laboratory sessions during the semester. 5 credits. Dr. Koutrakis, Dr. Rudnick. Covers the properties of environmental contaminants and the physical principles underlying their behavior. Topics include kinetic theory of gases, aerosols, thermodynamics, and combustion. Introduces air and water pollution, transport phenomena, and equilibria between environmental interfaces. Laboratories cover flow measurements and particle sampling. Prerequisite: College calculus, physics, and chemistry.

EH 262a. Introduction to Occupational Hygiene
Lectures and discussions. Two 2-hour sessions each week. 2.5 credits. Prof. Sherwood, Faculty Members, Guest Lecturers. The course comprises introductory lectures, and discussions on key aspects of industrial hygiene, covering recognition, evaluation and control of health hazards at work. Consideration is given to chemical, physical and biological hazards, and the criteria for each. Note: While intended primarily for students planning a career in that field, it provides background to the subject for students studying environmental issues, and is strongly recommended for students intending to take ID 263bc.

EH 263cd. Analytical Chemistry and Exposure Assessment
Lectures. One 2-hour session each week. One 4-hour laboratory session each week. 5 credits. Dr. P.B. Ryan, Dr. Yanagisawa. Exposes students to various techniques in analytical chemistry appropriate for environmental assessments in occupational and community settings. Groups of students are required to use these techniques in the design, implementation, and presentation of projects in environmental assessment. The course requires field work. Enrollment limited to 16 students. Prerequisite: EH 261ab or equivalent, EH-HPM 260cd or equivalent, BIO 200ab or equivalent, EH 274b, or EH 272d and Internship; signature of instructor.

EH 264d. Environmental Health Evaluation and Management
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. J. Harrington. Introduces quantitative approaches for modeling, evaluation, and management, with an emphasis on applications in environmental engineering, natural resource development, and risk management literature are examined using a systems analysis framework. Uses personal computers. Prerequisite: EH-HPM 260cd.

EH 265cd. Air Pollution and Hazardous Waste
Lectures, seminars. Two 2-hour sessions each week. 5 credits. Dr. Spengler, Dr. First. Critically examines the federal and state laws governing hazardous waste and air pollution. Reviews health effects, damage to animals, plants, and groundwater that may occur directly or by intermediate transport. Presents control, legal, and enforcement aspects. Course is not given if fewer than 9 students enroll. Prerequisite: (suggested) EH-HPM 260cd, EH 261ab, EH 263cd.

EH 266ab. Environmental Microbiology (FAS EPS 30)
Not to be given 1992-93. Lectures. Two 1.5-hour sessions each week. One 3-hour laboratory session each week. 5 credits. Dr. Mitchell, Dr. Ford. Considers microbial processes in natural habitats, including biogeochemical cycles and mental transformations. Examines evolution of microorganisms and development of survival strategies, as well as microbial processes in specific habitats, such as fresh waters, marine environments, and soils. This is an undergraduate course taught in Cambridge. Additional work is required of HSPH students. Prerequisite: A course in biology.

EH 267cd. Environmental Exposures Seminar
Seminars, discussions. One 1.5-hour session each week. 2.5 credits. Prof. Sherwood. Material for this course comes from the Exposure Assessment and Engineering Internship Program and from current research interests of the faculty. Students attend seminars given by recent internship participants and their supervisors from sponsoring organizations and participate in discussion sessions with faculty members. Prerequisite: Signature of instructor.

EH-EPI 268b. Respiratory Epidemiology
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Dockery. Reviews the epidemiology of chronic respiratory diseases. Demographic distribution and time trends of these diseases are presented. Known risk factors are discussed with particular attention to environmental hazards. Prerequisite: EPI 200a or EPI 201a.

EH 269ab. Environmental Organic Chemistry
Lectures. Two 2-hour sessions each week. 5 credits. Dr. P.B. Ryan. Development of physical and chemical concepts related to the fate and transport of organic contaminants in the environment. Prerequisite: Chemistry through organic, EH 261ab or equivalent; signature of instructor.

EH 270c. Basic Radiation Protection
(One half of ENG SCI 278) Not to be given 1992-93; offered alternate years. Lectures, demonstrations. Two 2-hour sessions each week. 2.5 credits. Dr. Shapiro, Dr. Moeller. Covers principles of radiation protection, interaction of ionizing particles with matter, the concept of radiation dose from external and internal sources, dose calculations, and radiation measurements.

EH 271d. Occupational and Environmental Radiation Protection
(One half of ENG SCI 278) Not to be given 1992-93; offered alternate years. Lectures, demonstrations. Two 2-hour sessions each week. 2.5 credits. Dr.Shapiro, Dr. Moeller. Covers the following topics: biological effects of radiation; radiation epidemiology; radiation protection standards and regulations; laboratory, industrial, and environmental of radiation; and methods of environmental and occupational radiation protection. Prerequisite: EH 270c or equivalent.

EH 272d. Practice of Occupational Hygiene
Lectures, discussions, laboratory. Two 2-hour sessions each week. 2.5 credits. Prof. Sherwood, Dr. P.B. Ryan, Dr. Yanagisawa. Lectures, discussions, and practical work round out first-year courses for industrial hygienists and provide knowledge needed by those embarking on internships. Covers such diverse matters as ethical, legal and tripartite issues, and hands-on experience of typical instruments, the balance being determined by students' needs. Prerequisite: ID 263bc and preferably EH 262a.

EH 273ab. Occupational Hygiene Internship
Fieldwork. Normal working hours of the company, plus that required for relevant reading. 20 credits. Prof. Sherwood. The student works in an industrial or similar workplace under the direction of a qualified and experienced industrial hygienist (a mentor). Generally, the first half of the period is devoted to learning evaluation techniques (e.g., personal air sampling, direct reading instrumentation, ventilation measurements) and the second half to studying some specific hazard or problem in depth, and preparing material for presentation in the succeeding course, EH 267cd. Prerequisite: Completion of first year of two-year master's program.

EH 274b. Introduction to Field Investigations
Lectures, laboratory. Two 1.5 hour-lectures and one 4-hour laboratory each week. 2.5 credits. Dr. Ryan, Dr. Yanagisawa. This course will give students an overview of designing, implementing, and analyzing environmental exposures in the field. Students will develop an original design stressing some respirable particle exposure with the potential for health impacts. Enrollment limited to 16 students. Prerequisite: EH 260cd, EH 261ab, BIO 200ab or equivalent; signature of instructor.

EH 275d. Global Climate Change: Impact/Response
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Yanagisawa, Dr. Spengler, Dr. Ozkaynak. This course provides the foundation to understand the physical and chemical aspects of heat balance of the Earth, greenhouse effect and climate change, and geological and public health impacts due to the climate change. Introduces mitigation measures approaching from engineering and socio-economic viewpoints. Besides above lectures, how the global environments and the climate changes are understood by students, the general public, law makers and policy makers is reviewed and discussed using publications in various media. Enrollment limited to 20 students. Course will not be taught if fewer than 6 students enroll. Prerequisite: Signature of instructor.

EH-EPI 280cd. Biomarkers in Occupational and Environmental Health
Lectures. One 2-hour session each week. 2.5 credits. Dr. Kelsey, Dr. Christiani, Dr. Monson. This course discusses the use of a wide variety of biomarkers applied to problems of exposure-related disease. The course will cover the use of biomarkers as measures of exposure, absorbed dose, biological effect and health outcome in acute and chronic disease states. Special emphasis will be placed upon the use of cellular and molecular biomarkers in epidemiology. The course will also address the use of biomarkers in the risk assessment process. Enrollment limited to 15 students. Prerequisite: Introductory biostatistics and epidemiology. Toxicology and environmental epidemiology are suggested; signature of instructor.

EH-BIO 290cd. Causal Inference from Observational Data
Lectures. One 3.5-hour session each week. 5 credits. Dr. Robins. Focuses on the instructor's new approach to causal inference in observational studies with sustained exposure periods. Particular attention is paid to the problems that arise when risk factors determine subsequent exposure. Philosophical, statistical, computational, and subject matter issues are considered. Emphasis is on the use of this approach in the control of the healthy worker effect in occupational mortality studies. The use of this new approach in non-experimental evaluations of the benefits of screening for cancer and of smoking cessation is also considered. Prerequisite: Knowledge of epidemiology to the level of EPI 207c and familiarity with statistical models (e.g., logistic regression models.)

HPM-EH 291b. Seminar on Risk Analysis
Seminars, discussions. Two 1.5-hour sessions each week. 2.5 credits. Dr. Graham, Dr. Evans, Mr. Grumbly. (Course described under Health Policy and Management.)

EH 300abcd. Tutorial Programs
Time and credit to be arranged. Opportunities are provided for individual tutorial work for qualified students in the fields of respiratory biology, respiratory epidemiology, occupational medicine, industrial hygiene and ventilation, aerosol technology, radiological health, nuclear medicine, solid waste management, air pollution control, and environmental health management.

EH 330. Field Work
Supervised site visits and field research projects are available in medical, industrial hygiene, and environmental health departments of industries and governmental agencies. Students in the various programs in occupational health may receive one credit unit for one week of field work in the "e" period. Students participating in the industrial internship program receive 20 credits for field work associated with their internship.

EH 350. Research
Doctoral students may undertake theoretical, laboratory, or field research under the direction of faculty members working in the following areas:

Air Pollution
Dr. Dockery, Dr. First, Dr. T. Ford, Dr. Koutrakis, Dr. Rudnick, Dr. P.B. Ryan, Dr. Speizer, Dr. Spengler, Dr. Yanagisawa. Industrial gas cleaning, personal exposure monitoring, assessment of air pollution potential from simple and complex pollution sources, indoor air pollution, health effects of air contaminants, epidemiology, and global air pollution.

Environmental Epidemiology
Dr. Dockery, Dr. Ferris, Dr. Gold, Dr. O'Connor, Dr. Speizer, Dr. Spengler. Population-based studies of environmental agents, including air pollutants (outdoor and indoor), drinking water contamination.

Environmental Health Management
Dr. Evans, Dr. J. Harrington, Dr. Hornig, Dr. P.B. Ryan, Dr. Spengler. Quantitative methods of environmental management, risk analysis, environmental standards, and criteria.

Industrial Hygiene
Prof. Burgess, Dr. Evans, Dr. Rudnick, Prof. Sherwood, Dr. Yanagisawa. Monitoring exposures of occupational groups to toxic air contaminants, aerosol physics, and ventilation. Ergonomic applications to job design.

Inhalation Toxicology and Cell Biology
Dr. Brain, Dr. Godleski, Dr. Kobzik, Dr. Valberg, Dr. Warner. Biological responses to inhaled particles and gases, deposition and clearance mechanisms, macrophage biology, pathogenesis of lung injury.

Mathematical Physiology
Dr. Butler. Modeling of organ systems, experimental design.

Occupational Health
Dr. Monson, Dr. Christiani, Dr. Eisen, Dr. Kelsey, Dr. Hu, Dr. Milton, Dr. Robins. Epidemiologic and field studies, health hazard evaluation.

Radiological Health
Dr. Moeller, Dr. Shapiro. Reduction of dose from sources of natural origin, radiation safety criteria and standards, control of radioactive contamination.

Respiratory Physiology
Dr. Banzett, Dr. Butler, Dr. Drazen, Dr. Loring, Dr. Shore. Physiological theory, measurement of respiratory function, and structural correlates.

Hazard and Solid Waste Management
Dr. First, Dr. Evans, Dr. Spengler. Incineration of solid wastes, including municipal, radioactive, biological, and laboratory materials. Identification and risk assessment of chemical contaminants in air, water and soil.

The following courses, offered in the Harvard Faculties of Arts and Sciences and Government, and at the Massachusetts Institute of Technology, are open to qualified students from the School of Public Health and may be of interest to students in the environmental health sciences:

Engineering Sciences 162. Hydrologic Cycles
Half course (fall term) Tu., Th., 10-11:30. Fiering. Prerequisite: Applied Mathematics 21b and one year of college-level physics.

Engineering Sciences 260. Engineering Systems for Environmental Control
To be given 1992-93; offered alternate years. Half course (spring term). M., W., F., at 10. Dr. J. Harrington. Prerequisite: Engineering Sciences 123 or permission of the instructor.

Engineering Sciences 264. Chemical Aspects of Natural and Polluted Waters
Half course (spring term). M., 1-4. Butler. Prerequisite: Physical chemistry (e.g., Chemistry 10 or Engineering Sciences 161), and some experience with biology and geology.

S-100. Natural Resources, Environmental Economics, and Policy
Half course. Tu., Th., 2:30-4. Stavins. Prerequisite: Introductory microeconomics.

MIT 10.805J. Technology, Law, and the Working Environment
Nine credits (fall term). M., 7-10 p.m. Ashford, Caldart. Prerequisite: Permission of the instructor.

Epidemiology

Note: Either EPI 200a or EPI 201a satisfies the school requirement of an introductory course in epidemiology. However, individual programs may require one or the other.

EPI 200a. Introduction to Epidemiology
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Cook. Covers the principles and methods used in epidemiologic research in a rigorous and in-depth manner. Designed as an alternative to EPI 201a for students majoring in Epidemiology or Biostatistics, or who desire more emphasis on issues dealing with the design, analysis, and interpretation of research studies. Note: Credit is not given for both EPI 200a and EPI 201a.

EPI 201a. Principles of Epidemiology
Lectures, seminars. Two 1-hour sessions and one 2-hour seminar each week. 2.5 credits. Dr. M. Goldman. Introduces the basic principles and methods of epidemiology. Lectures are complemented by seminars devoted to exercises or to the discussion of current examples of epidemiologic studies. Note: Credit is not given for both EPI 200a and EPI 201a.

EPI 202b. Elements of Epidemiological Research
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Spiegelman, Dr. Trichopoulos. Introduces elements of study design, data analysis, and inference in epidemiologic research. Principles and methods of epidemiology are presented with examples and exercises. Emphasizes practical rather than theoretical issues. May serve as an introduction to more advanced study or as a concluding course for those desiring a working knowledge of epidemiologic methods. Prerequisite: EPI 200a or EPI 201a, BIO 200ab or BIO 201ab (may be taken concurrently).

EPI 203c. Design of Case-Control and Cohort Studies
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Walker, Dr. Hsieh. Examines common problems in the design, analysis, and interpretation of cohort and case-control studies. Problems of exposure and disease definitions, time-dependent effects, confounding, and misclassification are considered in the light of data sources typically available. Relevant statistical methods are introduced but developed in detail only insofar as they affect study design. Prerequisite: EPI 202b and BIO 200ab, or signature of instructor.

EPI 204d. Analysis of Case-Control and Cohort Studies
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Hsieh, Dr. Walker. Develops the material presented in EPI 203c into the rationale and methodology for mathematical modeling of study parameters. Emphasizes Poisson and logistic regression. Prerequisite: EPI 203c.

EPI 205ab. Practice of Epidemiology
Tutorials, seminars, tutorial sessions during "a" period; one 2-hour seminar each week during "b" period. 2.5 credits. Dr. Stampfer, Dr. Colditz, Dr. Rimm. The seminars consist of student presentations of plans for collection and analysis of epidemiological data, with discussion by students and faculty. Preparatory work is done under tutorial arrangements with members of the faculty. The emphasis is on conceptual issues and not execution. Enrollment limited to 16 students. Prerequisite: Signature of instructor.

EPI 207c. Advanced Epidemiologic Methods
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Robins, Dr. Hsieh. Reviews a range of both classic and current readings pertaining to methodologic topics in epidemiology. Topics include: options in study design (subject selection, matching), confounding (definition and control), modeling (model selection, co-linearity, validity, and efficiency considerations), measurement error, estimation of direct and indirect effect, causal inference with time-dependent exposures and confounder, and selected analytic methods (exposure-response relation assessment, attributable fraction estimates). Background materials on each topic are summarized, followed by a student-led discussion. Prerequisite: Signature of instructor.

EPI 208s. Epidemiological Research in Clinical Effectiveness
Lectures, discussions. Five 1.75-hour sessions each week for seven weeks. 5 credits. Dr. Cook, Dr. L. Goldman (HMS). Covers the basic concepts and methods needed for traditional and clinical epidemiologic research through a series of lectures, exercises, critiques of published manuscripts, and presentations by guest speakers. Emphasizes applications to clinical research. Participants are required to make a formal presentation of a study design that addresses a specific clinical problem for discussion by the faculty and fellow students. Prerequisite: Acceptance into the Program in Clinical Effectiveness; signature of instructor.

EPI 209d. Key Developments in Epidemiologic Methods
Seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Maclure. Classic papers on quantitative methods and causal inference are reviewed. Topics include: meta-analysis selection bias, estimation and testing of relative risk, confounding, matching, interpretation of logistic models, causal criteria in non-experimental studies, and Popperian refutation. The historical perspective serves as a bridge between courses on current standard methods (EPI 203c, EPI 204d) and recent developments in methodology (EPI 207c). Prerequisite: EPI 202b or signature of instructor.

EPI 210c. Causal Thinking in Health Sciences
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Maclure. Covers purposes of causal statements in science and policy, types of causal reasoning. Uses an interactive pictorial model of causation to develop insight into synergism, antagonism, types of confounding, bias, chance, and criteria for causal inference. Surveys literature on causation. Sessions combine lectures and student presentations. Prerequisite: EPI 200a or signature of instructor.

EPI 211c. Reproductive Epidemiology
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. M. Goldman. Applies the principles of epidemiology to diseases and disorders of reproduction in both women and men. Considers study design and methodology in studies of reproductive health. Lecture topics cover , infertility, abortion, reproductive hazards in the workplace, sexually-transmitted diseases (including AIDS), reproductive cancers, and premature menopause. Sessions combine lectures and class discussions. Prerequisite: EPI 200a or EPI 201a.

EPI 212a. Epidemiology of Cardiovascular Diseases
Lectures. One 2-hour session each week. 1.25 credits. Dr. Stampfer, Guest Lecturers. Reviews the epidemiology of the chronic cardiovascular diseases. Demographic distribution and time trends of these diseases are presented, and known risk factors are discussed.

EPI 213c. Epidemiology and Genetics of Cancer
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Mueller, Dr. Li, Dr. Trichopoulos. Reviews basic concepts and issues central to cancer epidemiology. Considers the descriptive epidemiology of cancer and discusses the implications of the biology of cancer for identification of risk factors. Examines the role of smoking, genetic factors, radiation, nutrition, and viruses. Selected malignancies are discussed. Each student prepares a review of the epidemiology of a specific cancer site. Prerequisite: EPI 200a or EPI 201a.

EPI 214d. Epidemiological Analysis of Outbreaks of Infectious Disease
Lectures. One 2-hour session each week. 2.5 credits. Dr. Freeman, Dr. Platt (HMS). Discusses the use of epidemiologic methods in analyzing outbreaks and investigating infectious diseases. Different types of problems and various methods of analysis are illustrated. Stresses literature review and practical methodology.

EPI-EH 215cd. Environmental and Occupational Epidemiology
Lectures, seminars. One 2-hour session each week. 2.5 credits. Dr. Dockery, Dr. Monson, Dr. Robins. This course has three objectives: (1) to review methods used in evaluating the health effects of physical and chemical agents in the environment; (2) to review available evidence on the health effects of such exposures; and (3) to consider policy questions raised by the scientific evidence. Topics include: lectures on methodology, seminars on the review and criticism of current literature, and presentations by outside experts on the evaluation and impact of epidemiologic data. Prerequisite: EPI 200a or EPI 201a, BIO 200ab or BIO 201ab.

NUT-EPI 216cd. Nutritional Epidemiology
Lectures. One 2-hour session each week. 2.5 credits. Dr. Willett, Mrs. Witschi. (Course described under Nutrition.)

EPI 217a. The Epidemiology of Major Psychiatric Disorders
Lectures, discussions. One 3-hour session each week. 2.5 credits. Dr. Tohen, Dr. Zahner. This course covers a range of readings from early classics to recent work on the occurrence and distribution of psychiatric illness. Describes the application of basic epidemiologic research designs to the study of psychiatric conditions.

EPI 218b. Risk Factors in Psychiatric Epidemiology: Genetics and Environment
Lectures. One 3-hour session each week. 2.5 credits. Dr. Zahner, Dr. Tsuang. Reviews research methodology and empirical studies of genetic and psychosocial risk factors for psychiatric disorders. Topics include: genetic research designs; twin studies; perinatal risk factors; and psychosocial risk factors such as life stress, social roles, and the family and residential environment. Prerequisite: EPI 200a or EPI 201a.

EPI 219c. Concepts and Methods in Psychiatric Epidemiology
Lectures, discussions, laboratory/practice session. One 2-hour lecture session each week, and one 1-hour laboratory/practice session weekly, to be scheduled at the first course meeting. 2.5 credits. Dr. Zahner, Dr. Tsuang, Dr. Buka. Presents the application of basic epidemiologic and psychometric concepts and methods in psychiatric research. Topics include: measurement theory, reliability, validity, screening, and diagnostic classification procedures, as they specifically relate to psychiatric research. Prerequisite: EPI 200a or EPI 201a, BIO 200ab or BIO 201ab.

EPI 220d. Psychiatric Screening and Diagnostic Tests
Not to be given 1992-93. Lectures, seminars, outside practicum involving interviews. 2-4 hour practicum each week. 2.5 credits. Dr. Murphy. Focuses on interview schedules designed to identify psychiatric disorders and to provide diagnoses. Topics include: the history of such instruments as well as their construction, reliability, validity, and appropriateness for different kinds of studies. Practical experience in administering and analyzing the responses to such interviews plays a central role in the course. Prerequisite: EPI 217a or EPI 218b, EPI 219c; signature of instructor.

EPI 221b. Pharmacoepidemiology
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Walker, Dr. Platt (HMS). Addresses major issues in the attribution, evaluation, and quantification of drug effects, paying particular attention to unwanted effects and to observational studies. General principles are taught using in-depth investigation of recent controversies. Students are expected to review original research, participate in class discussion, and engage in role-playing exercises. This course is appropriate for students with special interests in pharmaceuticals and medical devices, and for those wishing an intermediate applied review of epidemiologic methods.

EPI 222d. Genetic Epidemiology of Diabetes and its Complications.
Seminar, Laboratory. One 2-hour session each week and two two-hour laboratory sessions. 2.5 credits. Dr. Krolewski. Uses the genetics of diabetes and its complications, together with the descriptive epidemiology of these conditions, will be used to illustrate the process of generating etiologic hypothesis which can be studied by the methods of genetic epidemiology. Techniques of molecular genetics relevant to epidemiologic studies will be reviewed and demonstrated. Data sets which include genotype information will be analyszed with an emphasis placed on the examination of various gene/environment interaction. Prerequisite: EPI 202b.

MCH-EPI 223b. Childhood Mental Disorders: Public Health Perspectives
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Deykin. (Course described under Maternal and Child Health.)

EPI-PIH 224b. Epidemiology of AIDS in Developing Countries
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Hunter, Dr. Lallemant. Discusses epidemiological methods appropriate for the study of the HIV epidemic and other chronic viral infections in developing countries. Describes methods for etiologic research on, and development and assessment of interventions against, these diseases. Presents practical problems in implementing research in developing countries, as well as ethical and cost-effectiveness issues of different research strategies. Prerequisite: BIO 200ab or BIO 201ab, EPI 200a or EPI 201a.

EPI 226b. Managing Epidemiologic Data
Lectures. One 2-hour session each week. 1.25 credits. Dr. Hunter. This course teaches general principles of data management for epidemiologic surveys and analytic studies. Students use a microcomputer package — EPIINFO — to replicate the experience of conducting a case control study from questionnaire design through to analysis. Enrollment limited to 30 students. Prerequisite: Signature of instructor.

EH-EPI 235ab. Scientific Basis of Occupational Health Regulations
Seminars. Two 2-hour sessions each week. 5 credits. Dr. Robins, Dr. Eisen, Dr. Wegman. (Course described under Environmental Health.)

EPI 236s. Methods of Clinical Epidemiology
Eight-ten 1.75-hour sessions per week (32 morning sessions; 1-2 per day). 5 credits. Dr. Cook, Dr. Lee, Dr. Mangione. Through a series of lectures, workshops and computer sessions, this course covers the issues involved in the development and assessment of instruments used to measure the "soft" outcomes used in clinical research (clinometrics). It also addresses the options that are commonly used to develop and assess clinical prediction rules. Participants are required to develop a measurement instrument and also, using clinical data sets, develop a clinical prediction rule. Prerequisite: Introductory epidemiology and biostatistics; acceptance into the Program in Clinical Effectiveness; signature of instructor. Not open to students who have taken EPI 206cd.

HPM-EPI 237d. The AIDS Epidemic: Legal and Ethical Analysis
Lectures, case studies. One 2-hour session each week. 1.25 credits. Mr. Gostin, Dr. Mueller. (Course described under Health Policy and Management.)

EPI 241c. Clinometrics
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Cook, Dr. Lee (HMS), Dr. Mangione (HMS). The course covers issues related to the various "soft" measurements encountered in clinical research, including generic and disease-specific measures of health, quality of life, functional status, severity of disease, and co-morbidity. Lectures provide a overview of some of the existing instruments that are used to measure these phenomena. Additional lectures cover the methodologies used to develop new instruments and to evaluate their reliability and validity. Prerequisite: Introductory epidemiology and biostatistics.

EPI 242abcd. Seminar in Clinical Epidemiology
Lectures, student presentations. One 1.5-hour session each week. 2.5 credits for whole year. Dr. Cook, Dr. L. Goldman (HMS), Dr. Orav. Through a series of presentations by guest speakers, students are exposed to a number of clinical research projects that use a variety of designs and analytic strategies. Each presentation is followed by a short summary by one of the faculty who emphasize a methodologic issue that pertains to the presentation. Student involvement is encouraged and each student is required to give a detailed presentation of a project with which they are currently involved or plan to develop. Prerequisite: Enrollment in the Clinical Epidemiology Program within the Department of Epidemiology.

EPI 251b. Clinical and Molecular Epidemiology of Cancer
Lectures. One 2-hour session each week. 1.25 credits. Dr. Li, Dr. Cook, Dr. Weeks (HMS). This course is an introductory overview of the molecular genetics and epidemiology of cancer, with emphasis on use of new laboratory techniques in epidemiologic studies. Also discussed will be the application of epidemiologic methods to the analysis of clinical practices in cancer. Prerequisite: EPI 200a or EPI 201a.

EPI 252d. Epidemiology of Virus-Associated Malignancy
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Mueller, guest lecturers. This course reviews the epidemiology and public health impact of virus-associated malignancy. The role of host response and the use of serology and viral probes as risk markers are discussed. A related disease of unknown etiology is discussed as a case study. Prerequisite: EPI 200a or EPI 201a.

PIH-EPI 255c. AIDS: Responding to a Global Epidemic
Two 2-hour sessions each week. 2.5 credits. Dr. Mann. (Course described under Population and International Health.)

EH-EPI 268b. Respiratory Epidemiology
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Dockery. (Course described under Environmental Health.)

EH-EPI 280cd. Biomarkers in Occupational and Environmental Health
Lectures. One 2-hour session each week. 2.5 credits. Dr. Kelsey, Dr. Christiani, Dr. Monson. (Course described under Environmental Health.)

EPI 290s. Diagnosis of Major Psychiatric Disorders in a Clinical Setting
Field experience. Two 2-hour sessions and one 1-hour individual meeting each week for eight summer weeks. 2.5 credits. Dr. Tohen, Dr. Vuckovic (HMS). A summer rotation in a clinical psychiatric setting (McLean Hospital) designed to familiarize the student with a contemporary biomedical approach to psychiatric practice, with an emphasis on the diagnosis of major psychiatric disorders and clinical epidemiologic research. Teaching and readings will focus on diagnostic criteria for schizophrenia, bipolar disorder, major depression, and other psychotic conditions. The student will participate in rounds and meet regularly with the psychiatrist-in-charge and psychiatric residents to discuss inpatient evaluations. In addition, students will meet with clinical investigators to discuss topics in clinical research and neuroscience. Students may also design a supplemental summer research tutorial (EPI 300) involving supervised readings and/or laboratory experience in an ongoing clinical epidemiologic research project. Prerequisite: Signature of instructor; EPI 217a recommended. Primarily intended for students in the Psychiatric Epidemiology and Biostatistics training program. Enrollment limited to 3 students.

EPI 300abcde. Tutorial Programs
Time and credit to be arranged. Students may participate in department research in close association with a staff member. Time and credit are to be arranged with the chair of the department.

EPI 350. Research
In selecting topics for research in doctoral programs, students should consider the fields in which members of the department are currently working. These include:

Neoplastic Diseases
Dr. M. Goldman, Dr. Hsieh, Dr. Hunter, Dr. Maclure, Dr. Monson, Dr. Mueller, Dr. Trichopoulos, Dr. Willett

Cardiovascular Disease
Dr. Stampfer, Dr. Maclure

Molecular and Genetic Epidemiology
Dr. Krolewski, Dr. Li

Environmental Epidemiology
Dr. Monson, Dr. M. Goldman

Occupational Epidemiology
Dr. Monson

Infectious Diseases
Dr. Brinkmann, Dr. Freeman

Epidemiologic Methods
Dr. Walker, Dr. Hsieh, Dr. Cook, Dr. Spiegelman

Nutritional Epidemiology
Dr. Willett, Dr. Stampfer, Dr. Colditz

Virus-Associated Chronic Disease/AIDS
Dr. Hunter, Dr. Mann, Dr. Mueller

Psychiatric Epidemiology
Dr. Tsuang, Dr. Murphy, Dr. Tohen

Pharmacoepidemiology
Dr. Walker

Reproductive Epidemiology
Dr. Goldman

Health Policy and Management

BIO-HPM 203b, 203c, 203d. Statistical Methods for Health Policy and Management (Module I, II, III)
Lectures. Three 2-hour sessions each week. 2.5 credits each period. Dr. Spino, Dr. Williams. (Course described under Biostatistics.)

HPM 205ab. Economic Analysis for Public Health
Lectures, discussions. Two 1.5-hour sessions each week. 5 credits. Dr. Hemenway. Provides an introduction to the basic principles of economics and economic analysis, particularly as they apply in the public health field. A systematic introduction to macroeconomic theory includes the determinants of supply and demand, the theory of markets, and the concept of economic efficiency. Specific topics in health care economics include demand for health care, insurance, and the market for physician services. May not be taken for credit by students who previously have taken HPM 206ab.

HPM 206ab. Economic Analysis
Lectures, seminars. Three 2-hour sessions each week. 5 credits. Dr. Hemenway. Designed to bring students to an intermediate-level understanding of economic theory. Emphasizes the uses and limitations of the macroeconomic approach. May be taken for credit by students who previously have taken HPM 205ab only with the signature of instructor.

HPM 207ab. Econometrics for Health Policy
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Latimer. Introduces econometrics to students already familiar with multiple regression. Topics include: serial correlation, cross-sectional time series, simultaneous equations, logit and probit. Emphasizes the connection between analysis of a policy issue (especially economic analysis) and econometric modeling. Prerequisite: Course in statistics or familiarity with linear regression; signature of instructor.

HPM 208cd. Health Care Regulation and Planning
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Blendon, Mr. Knickman. Examines the regulation and reimbursement of health care institutions and providers. Topics include: rate regulation of hospitals, long-term care facilities, and physician fees; regulatory efforts to improve the quality of care; and access to care by the uninsured. Competitive approaches to cost containment and efforts by the private sector to control costs are also explored. Attention is also given to efforts to limit capital spending and the general role of health planning. Focus is on the process of regulatory change, the goals and design of regulatory and planning programs, and their intended and unintended impacts. Prerequisite: HPM 206ab or equivalent.

HPM 209b. Public Health Law, Policy, and Ethics
Lectures. Two 2-hour sessions each week. 2.5 credits. Mr. Gostin. Covers the major areas of health policy facing the nation, and teaches skills for analysis and effective policy response, balancing efficacy and human rights. Covers traditional concepts such as authority, autonomy and privacy (informed consent, confidentiality, and discrimination), infectious disease (casefinding and personal control, and special populations), and law and mental competency (the right to get, and to refuse, treatment). Addresses modern issues "off the front pages of The New York Times" — the drug epidemic, the "right to die", and the fetal/maternal conflict.

HPM 210d. Medical Malpractice and Risk Management
Lectures. Two 1.5-hour sessions each week. 2.5 credits. Mr. Moulton. Focuses upon the development, implementation, and evaluation of risk management programs and legislative reforms in patient compensation plans. Attention is given to medical and hospital malpractice experience, key legal decisions in the area, and legislative reform movements setting up arbitration, screening panels, tort-law changes, no-fault mechanisms, etc. Emphasizes the interrelationship of quality of care standards and quality assurance to malpractice vulnerability and risk management programs.

HPM 211cd. Advanced Seminar in Law and Public Health
Lectures, discussions, student presentations. One 3-hour session each week. 5 credits. Instructor to be arranged, Guest Lecturers. Provides an opportunity for legally-trained students in the Program in Public Health for Lawyers and other qualified students to work together and exchange experiences in the application of legal issues to current public health problems. The seminar is the focus for a legal research paper on a topic of health law mutually determined by student and instructor. Legal issues concentrate on matters of importance in representing health organizations in governmental and private sectors. Prerequisite: Signature of instructor.

PIH-HPM 213d. Management Information Systems for Third World Health Systems
Lectures, discussion, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Reich, Dr. Lamstein. (Course described under Population and International Health.)

HPM 214d. Meta-Analysis of Clinical Trials and Their Impact on Medical Efficiency
Not to be given 1992-93. Seminars, tutorials. One 3-hour session each week. 2.5 credits, plus additional units for tutorial. Dr. Chalmers, Members of the Department. Designed as a follow-up to BIO 214c. Concerned with the place of clinical trials in the practice of preventive, diagnostic, and therapeutic medicine. Students learn to evaluate, conduct, coordinate, and combine clinical trials. Related tutorials are conducted throughout the year. Students conduct meta-analysis in a field of their choice. Guidance and collaboration are given in searching literature for RCTs on diagnostic evaluations, gathering and analyzing data, and preparing abstracts for presentation at national meetings and publication of manuscripts in peer-review journals. Prerequisite: An interest in the application of the scientific method to the prevention, diagnosis, and treatment of disease.

MCH-HPM 215cd. Planning and Evaluation of Public Health Programs
Lectures. One 2-hour session each week. 2.5 credits. Dr. Gardner. (Course described under Maternal and Child Health.)

HPM-PIH 218c. Human Rights for Public Health Practitioners
Two 2-hour sessions each week. 2.5 credits. Dr. Mann, Mr. Gostin, Dr. Tomasevski. Provides the basis for literacy on human rights, designed for public health practitioners. Places emphasis on the following: the universality of human rights; knowledge of international rights norms, institutions, and procedures; and application to public health work. Case studies are used to develop skills in responding to human rights issues in public health. Course concludes with practical workshops in application of course knowledge to public health work. This course will not be given if fewer than 10 students enroll. Prerequisite: Signature of instructor.

HPM 219a. Financial Transactions and Analysis
Lectures, seminars. Three 2-hour sessions each week. 2.5 credits. Dr. Kane. This is an intensive course which introduces concepts of financial accounting for the non-accountant user of financial information. Basic accounting transactions, statement preparation, concepts of accrual accounting, accounting for capital, and fund accounting are presented in the first half of the course. The second half focuses on statement analysis in a variety of decision-making situations common to health care organizations. Enrollment limited to 60 students. Prerequisite: Signature of instructor. Completion of Lotus 1-2-3 tutorial and Anthony's Essentials of Accounting before class begins. (Instructions will be distributed during orientation week.)

HPM 220b. Financial Management and Control
Lectures, case discussions. Three 2-hour sessions each week. 2.5 credits. Mr. Siegrist. The course is designed to introduce students to cost accounting and management control concepts and uses for health service organizations. The first part of the course develops a basic knowledge of cost accounting, including full and differential costing techniques. The remainder of the course focuses on management control structure and process and addresses topics such as responsibility accounting, budgeting, reporting and variance analysis. Enrollment limited to 60 students. Prerequisite: HPM 219a; signature of instructor.

HPM 221ab. Management in Public Health in Industrialized Countries
Lectures, seminars. Two 2-hour sessions each week. 5 credits. Dr. Roberts. Introduces the management of health delivery organizations in industrialized countries. Topics include: organizational issues, financial management, cost accounting, management control systems, and institutional strategy. Combines cases, lectures, and speaker presentations, supplemented by topical readings, as a vehicle for analyzing management problems and evaluating alternative solutions. Introduces relevant managerial concepts and theories.

HPM 229cd. Legal and Management Aspects of Health Care in the Workplace
One 3-hour session each week. 2.5 credits. Mr. Moseley. Introduces the full range of new health care issues confronting U.S. employers: employee disabilities, alcohol and drug abuse, AIDS, fetal protection, medical screening, pregnancy and maternity benefits, job stress, smoking, employee assistance programs (EAPs), health promotion and employee wellness, and health care cost containment. Examines legal implications of these issues and suggests specific, practical policies and procedures for managing these issues to minimize employer cost and maximize employee health and productivity.

HPM 230cd. Managing People in Health Care Organizations
One 3-hour session each week. 5 credits. Mr. Moseley. Explains the basic systems and strategies for managing human resources in health care delivery organizations. Studies the basic principles of recruiting ancillary and professional staff (particularly nurses and physicians), managing and supervising their job performance, correcting the problems they present (absenteeism, substance abuse), and when necessary firing them. Stresses the role of labor unions in hospital operations, the management of medical staff relations, and the downsizing of hospital work forces.

HPM 231c. Competitive Strategy Determination
Case discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Kerr. Focuses on the conceptual framework needed to plan for the long-term viability of health care (and other) organizations. Using selected readings and case studies of both health care and non-health care organizations, students will learn to appreciate the concepts of competitive strategy and competitive advantage primarily through practice in analysis. The objective is to provide students with the conceptual tools and the practical skills to enable them to formulate and evaluate organizational strategy.

HPM 232c. Operations Management in Service Delivery Organizations
Case discussions. Six-week course: three 2-hour sessions each week for four weeks and two 2-hour sessions each week for two weeks. 2.5 credits. Dr. Pliskin. Examines the special problems entailed in designing, producing, marketing, and delivering services, and explores how the specific tasks faced by managers vary across types of service organizations. Focuses on key operational tasks involved in optimizing performance. Links between operations, human resource, and marketing functions in service of businesses are examined in depth.

HPM 233d. Strategic Marketing Management in Health Systems
Seminars, case studies, lectures. Two 2-hour sessions each week. 2.5 credits. Mr. Wasek. Examines marketing within a strategic framework across the public and private sectors, domestic and international health systems, and social marketing contexts. Marketing management, research, and strategy techniques are discussed and applied to program design, business planning, and implementation issues. Course emphasizes analytic skills development in marketing.

HPM 234d. Managing in Health Organizations
Lectures, case studies. Two 2-hour sessions each week. 2.5 credits. Mr. Cannon. This course provides a review of the essential tasks, functions and skills of general managers. Case discussions and exercises will expose students to practical skills employed by general managers in health organizations such as the art of negotiation, systematic approaches to personnel selection, developing consensus for organizational priorities, making good use of consultants and middle management, diagnosing problems and allocating resources.

HPM-EPI 237d. The AIDS Epidemic: Legal and Ethical Analysis
Lectures, case studies. One 2-hour session each week. 1.25 credits. Mr. Gostin, Dr. Mueller. Uses the case method to analyze legislative and other legal developments in the United States and internationally that are designed to deal with the worldwide AIDS epidemic. Ethical problems including personal rights, confidentiality, and discrimination are also examined. Attention is given to current epidemiological factors impacting upon public health law and regulatory programs such as voluntary and mandatory screening, disease reporting, case finding, and contact tracing.

HPM 238b. Managing Management Information Systems
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Glaser. Examines issues related to the effective management of information technologies and the information systems function. The focus is on information systems planning, system evaluation, selection and implementation, information system policies and management mechanisms, management information systems and evaluation of new information technologies. Uses case method instruction and role playing, supplemented by topical readings.

HPM 239b. Applied Financial Analysis of Hospitals
HPM 239cd. Applied Financial Analysis of Hospitals
Lectures, discussions. One 2-hour session each week. 1.25 credits for "b" period; 2.5 credits for "cd" semester. Dr. Kane, Guest Lecturers. In this applied skill-building course, students are assigned a set of hospital financial statements to convert to a LOTUS standardized format, build a data base with financial and other hospital-specific variables, convert the data to a SAS file, analyze a specific research question using PC-SAS, and write and present findings. Research questions vary in response to outside agencies' requests, major public health issues, or special interests of students. Course provides the opportunity to apply skills introduced in HPM 219a and to participate in a group research project. Prerequisite: HPM 219a and signature of instructor. HPM 239b is a prerequisite for HPM 239cd.

PIH-HPM 240d. Political Economy of International Health Policy
Seminars, case discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Reich. (Course described under Population and International Health.)

HPM 241ab. Health Policy in the United States (KSG HCP-100)
Lectures. Two 1.5-hour sessions each week. 5 credits. Dr. Feldman. Examines the goals of health policy and alternative means for achieving those goals. The current performance of the health care system is discussed, with special emphasis on the shifting health needs of the population, the growing cost of health services, and the equity of the health care system. A review of the important actors in the health care system is the basis of a systematic examination of alternative policy strategies.

HPM-MCH 242b. Strategies for Change in Health
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Blendon, Dr. Feldman, Guest Lecturers. Focuses on development of strategies to influence public policy in order to improve the health of populations. Topics include: the legislative process, the courts, administrative/legislative bodies, the media, public opinion, advocacy groups, policy research, and other avenues to effect change in health care and health care outcomes. Guest lecturers teach practical skills that will aid students in improving their effective use of these institutions to influence the formation of public policy.

HPM 243c. Health Economics: Economic Analysis of the Health Care System
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Hsiao. Introduces health economics, using economic analysis to examine major health care financing and delivery issues, and the development of policies and programs designed to address them. Topics include: health care financing, health care access and utilization, control of cost inflation, market structure, competition, and national health plans. Prerequisite: HPM 205ab or HPM 206ab or equivalent.

HPM 244d. Pharmaceutical and Biotechnology Industries: Public Policy and Regulatory Issues
Seminars, case studies. One 2-hour session each week. 1.25 credits. Mr. Norris. This course analyzes public policy and legal issues in the important health care industries of pharmaceutical and biotechnology in the U.S. and worldwide. Research and development of new biomedical products is stressed. Regulatory programs for new product development, the ethics of clinical investigation, and the ethics of conflict of interest are also examined.

HPM 245d. Leadership in Public Health
One 2-hour session each week, four 2-hour labs. 2.5 credits. Dr. Prothrow-Stith, Dr. Blendon. This course responds to recent criticism by the Institute of Medicine that public health schools are failing to train professionals to work in health agencies. It provides students with concrete skills needed to fill leadership positions in health. Topics include: articulation of goals, negotiation, budget development, and constituency building. Recommended to follow ID 250a and HPM 242c. Students should demonstrate an interest in careers in public leadership.

HPM 246c. The Allocation of Health Resources
Seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Hiatt. Considers the background of the problem of allocating health resources in the U.S. and possible responses to its challenges. Discusses the stress placed on health resources by increasing medical capabilities, needs, and demands, and the disparity between what we can do and what we can afford to do. Prerequisite: Signature of instructor.

HPM 247d. Injuries and Public Policy
Not to be given 1992-93. Seminars, case studies, lectures. One 3-hour session each week. 2.5 credits. Dr. Hemenway. Introduces students to the problems of injury, from a social science perspective. Discusses and analyzes approaches to understanding the problem, and policies to mitigate the consequences of both accidental and intentional injury. Specific categories of injury, such as fires, violence, and motor vehicle collisions are examined in detail.

HPM 248cd. Business and Labor in the Health Care System (KSG HCP-280)
Seminars. One 2-hour session each week. 2.5 credits. Dr. Blendon, Dr. Newhouse. Examines key issues in the health care system as they affect doctors, hospitals, insurers, governments, and the public through the perspective of business and labor organizations. Analyzes the roles of labor and management, their interactions on benefit policies and collective agreements, and their impact on issues of public policy concern. Student projects examine the business and labor perspectives on proposals for health care system reform. Enrollment limited to 20 students. Permission of the instructor given first class.

HPM 249cd. Development of Federal Health Policy
Seminars, case studies. One 2-hour session each week. 2.5 credits. Dr. Calkins, Dr. Nuzzo. Discusses the interplay of forces, both internal and external to government, which influences federal health policy decisions. Describes the actors and policy development process. Develops skills in the following areas: policy analysis; writing of memoranda, testimony, and speeches; media relations. Draws on readings from the health care and political science literature.

HPM 250cd. Designing a New Health Care System for the United States
Discussions, seminars. Two 2-hour sessions each week. 5 credits. Mr. Moseley, Dr. Blumenthal. Teams of student/consultants will prepare detailed proposals for the creation of a new health care system for the United States. In the process, the students will gain a comprehensive, integrated familiarity with the key decision makers, institutions, political forces, financial flows and vested interests in the existing system. The students will be given extensive background literature and data; they will conduct their own research; they will hear guest speakers from each sector of the health care system; they will prepare progress reports; they will share their research and their thinking with other teams; and they will make a formal presentation of their proposals to a panel of health care authorities.

HPM 254c. Functional Outcomes of Medical Care
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Tarlov, Dr. John Ware. In this course each student is to acquire working expertise with health as a concept, the measurement of functional status and well-being, and the use of functional status in community health programs and in policy formulation. Each student will be given a data set from a large national research project. Each student is expected to prepare a manuscript, and analyze, interpret and point up the policy relevance of the data. Prerequisite: Signature of instructor, graduate course in statistics or equivalent proficiency, course in health services, familiarity with computers.

HPM 255d. Reimbursement Systems
Seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Kane. Examines issues related to the general theme of third-party reimbursement for health care institutions. The principal focus is on hospitals. Issues include cost containment efforts, hospital perspectives, and the role of incentives. Some specific systems are examined in detail in order to assess the feasibility of certain techniques and to address questions of overall reimbursement system design. Prerequisite: Introductory courses in financial and cost accounting are recommended.

HPM 256c. Evaluation of Quality of Health Care
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Palmer. An intensive preparation in methods and strategies for evaluation of quality of health care. Through lectures, classroom exercises, teaching assistant sessions, and homework, students learn the terminology, concepts, and strategies for quality assessment. Guest speakers describe applications to a variety of health care environments in which they work. Prerequisite: Experience with delivery of personal health services is strongly desirable, as well as an understanding of basic principles of biostatistics and epidemiology.

HPM257c. Use of Outcomes in Quality Assessment
One 2-hour session each week. 1.25 credits. Dr. Greenfield. Addresses the applications of outcomes research to quality of care assessment and effectiveness. Focuses on the historical, conceptual, and practical basis for using outcome vis-a-vis process. Develops the basis for the routine interpretation and use of health status measures. Prerequisite: Signature of instructor; introductory course in epidemiology and statistics.

HPM 258d. Physician Performance
Seminar. Two 2-hour sessions each week. 2.5 credits. Dr. Calkins. Examines factors influencing physician practice, including training, experience, organizational setting, financial incentives, and patient preferences. Considers strategies for changing physician behavior, such as education, feedback, guideline development, and outcomes research. Experience in health care delivery is an advantage, but is not required.

HPM 259d. Quality Management in Health Care
One 2-hour session each week. 1.25 credits. Dr. Palmer, Dr. Jennison, Dr. Laffel, Dr. James, Dr. Lawthers. This course introduces the concepts and tools of Total Quality Management. The techniques of Quality Management originated in the industrial sector and have been successfully applied to health care delivery. Through lectures and case studies, students learn to develop and implement Quality Management Systems. Topics include: continuous quality improvement, quality planning, measurement, design and improvement, and statistical process control.

EH-HPM 260cd. Fundamentals of Exposure and Risk Assessment (ENG SCI 273)
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Evans, Dr. P.B. Ryan, Dr. Graham. (Course described under Environmental Health.)

HPM 266cd. Seminar on Refugee Trauma
One 2-hour session each week. 2.5 credits. Dr. Mollica, Dr. Anderson, Dr. Lavelle. This course focuses on the public health problems of highly traumatized refugee populations. Millions of refugees and displaced persons exist world-wide. Many are suffering from poor health, economic and cultural deprivation, on going violence, and long-term confinement. This course is a comprehensive overview of the international approach, theoretical models, and public health strategies for dealing with the refugee crisis. Innovative health and mental health problems will be presented. Video and guest lecturers will supplement the course's academic framework.

HPM 268cd. Financing Health Care in Developing Nations
Lectures, case studies. Two 2-hour sessions each week. 5 credits. Dr. Hsiao. This course provides students with a wide-ranging introduction to public and private financing of health care in developing countries. Financing methods covered include community financing, social insurance, user's fees, privatization, and efficiency improvement. Analyzes economic considerations in alternative approaches to financing, including equity, efficiency, and stability. Reviews formal perspective of economic theory. Assesses link between stages of national development and health care financing. Prerequisite: HPM 205ab or 206ab or signature of instructor.

HPM 269b. Comparative Health Systems in Industrialized Societies
Not to be given 1992-93; offered alternate years. Lectures. One 3-hour session each week. 2.5 credits. Dr. Field. A comparative examination of the health systems of industrial and urban societies. This course seeks to better apprehend shared structural features as well as critical differences. A basic framework for the comparative approach is presented, as well as substantive materials on several health systems. A national health system is a result of the dialectic synthesis of (1) universal aspects of scientific and medical knowledge and techniques held to be valid everywhere, and (2) the particular aspects of each nation's social structure, political culture, history, traditions and value commitments, as well as its economic resources. This course will attempt to demonstrate how essentially the same problems are approached in a variety of ways, provided the student is aware that the didactic aspect of such an exercise is limited by the particular elements mentioned above.

HPM 270a. Issues in Mental Health Policy (KSG HCP-377m)
Seminars, discussions. One 3-hour session each week. 2.5 credits. Dr. Dorwart, Dr. Chartock. Reviews the historical development and current status of policy issues relevant to mental health and mental illness. Detailed attention is given to the role of government and to identifying areas where further research is needed.

HPM 272s. Health Services/Policy Research
Lectures, discussions. Five 1.75-hour sessions each week for 3-1/2 weeks. 2.5 credits. Instructor to be arranged. Introduces major issues in health policy, including access, provision of insurance, and physician and hospital payment. Examines methodologies used to study these areas, including assessment of severity of illness and health status, measurement of quality, and survey techniques. Demonstrates how research techniques can be used to study policy-relevant areas. Prerequisite: Acceptance into the Program in Clinical Effectiveness.

HPM 274ab. Dental Care Administration Research Seminar
HPM 274cd. Dental Care Administration Research Seminar
(HDS DCA 222) Lectures, seminars. One 3-hour session each week. 5 credits for both semesters. Dr. Douglass. The fall term concentrates on the research methods of current national studies of the need, supply, demand, and cost of dental care. Policy documents of the ADA, IOM, OTA, Research Triangle Institute, RAND Corp., and the NCHS are studied. Research designs and data collection methods are reviewed. The spring term emphasizes the research work of faculty and students on relevant dental care policy and management subjects. Grade is based upon participation and the defense of a current research project.

HPM 275ab. Dental Public Health and the Dental Care Delivery System
Seminars, case studies, lectures. One 2-hour session each week. 2.5 credits. Dr. Antczak, Members of the Department. Reviews basic concepts in dental public health and the dental care delivery systems in the U.S. and other countries. Examines issues of utilization of services, need versus demand for dental care, methods of quality assurance, and the role of government agencies in the provision and regulation of dental care. The effects of alternative methods of financing dental care on utilization and provider incentives are also discussed.

HPM 276cd. Technology Assessment in Dentistry
Seminars. One 2-hour session each week. 2.5 credits. Dr. Antczak. Examines basic concepts in the epidemiology of oral diseases and reviews changes in disease prevalence. Discusses the measurement of oral health status into treatment needs for planning purposes. Methods of evaluating dental care are also covered, including clinical decision making, research design, quality assessment of experimental evidence, and meta-analysis.

HPM 279c. Quantitative Policy Analysis
Seminars, case studies, lectures. Three 2-hour sessions each week. 2.5 credits. Dr.Pliskin. Introduces students to techniques of decision analysis, cost-effectiveness analysis, and benefit-cost analysis. Emphasizes applications in the areas of health policy, planning, and management. Readings from health, safety, and environmental literature are used to illustrate the techniques and their limitations.

HPM-BIO 280b. Decision Analysis for Health and Medical Practices
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Instructor to be arranged. Concerns the methods and applications of decision analysis, cost-effectiveness analysis, and cost-benefit analysis in the evaluation of medical technologies and health programs. Stresses applications and limitations. Examples used to illustrate techniques include: treatment decision for acute abdominal pain, coronary artery bypass surgery, cost effectiveness of pharmaceuticals, evaluation of immunization programs, and priority setting for AIDS prevention. Course emphasizes applications to medical technology assessment and health care resource allocation. Prerequisite: BIO 200ab or BIO 201ab or BIO-HPM 203b (may be taken concurrently) or equivalent introductory course in probability and statistics.

HPM-BIO 281c. Seminar on Clinical Decision Analysis
Seminars, lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Weinstein. Intended to enhance the student's ability to conduct independent analyses of medical decisions. Didactic sessions critically review published analyses and address selected topics, such as evaluation of diagnostic tests, utility assessment, and use of computer aids. Prerequisite: HPM-BIO 280b or signature of instructor. Presumes knowledge of principles of decision analysis.

HPM-BIO 282d. Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation
Seminars, lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Graham, Dr. Johannesson. Topics include: methods and applications of cost-effectiveness and cost-benefit analysis for health program evaluation, medical technology assessment, and environmental risk analysis; theoretical foundations; "shadow" pricing; economic valuation of life saving; choice of discount rates; cost accounting applied to economic evaluation in institutional settings; methods for assessing costs of environmental controls; economic evaluation of biomedical research; health status indexes; ethical issues; and modern critiques. Students prepare a written critique of a published analysis and develop an independent analysis plan of their own choice. Prerequisite: HPM-BIO 280b, HPM 279c, HPM 286s, or equivalent; HPM 205ab, HPM 206ab, or equivalent.

HPM-BIO 284ab. Topics in Health Decision Sciences
Not to be given 1992-93; offered alternate years. Seminars, lectures. One 2-hour session each week. 2.5 credits. Instructor to be arranged. Presents selected topics in the theory and methods that underlie decision and risk analysis, including axiomatic foundations of expected utility theory, statistical decision theory, ROC analysis and diagnostic technology assessment, multiattribute utility theory, criticisms, alternatives, and research frontiers. Prerequisite: HPM-BIO 280b, HPM 279c, or signature of instructor; at least one semester of biostatistics beyond the introductory level; knowledge of elementary calculus and matrix algebra.

HPM 286s. Decision Analysis in Clinical Research
Lectures, discussions. Five 1.75-hour sessions each week for 3 1/2 weeks. 2.5 credits. Dr. Weinstein. Introduces the following topics: decision analysis methods relevant to clinical decision making and clinical research; probability theory and the use of probability to express uncertainty; utility theory and its use to express patient preferences for health outcomes; diagnostic test use and evaluation; and uses and limits of decision analysis in clinical decision making and research design. Enrollment limited to 30 students. Prerequisite: Acceptance into the Program in Clinical Effectiveness; signature of instructor.

HPM 290ab. Applied Research and Practice in Health Policy and Management
HPM 290cd. Applied Research and Practice in Health Policy and Management
Seminars. One 2-hour session each week. Field work. One day each week. 5 credits each semester. Dr. Hemenway, Dr. Seigel, Mr. Kasten, Dr. Feldman, Dr. Reich, Dr. Berman. Teaches students to apply analytic and managerial methods to concrete problems. Each student carries out a research project, conducts a policy analysis, or performs a management study on behalf of an individual or institutional sponsor. Students work with course faculty and sponsors to develop project proposals. Students meet individually and in small groups with faculty advisors and preceptors from sponsoring institutions to discuss project methods. At the conclusion of the course, students prepare oral and written reports summarizing their findings. Prerequisite: Acceptance into the two-year Master of Science program in Health Policy and Management or signature of instructor.

HPM-EH 291b. Seminar on Risk Analysis
Seminars, discussions. Two 1.5-hour sessions each week. 2.5 credits. Dr. Graham, Dr. Evans, Mr. Grumbly. Challenges students to evaluate the risk analysis framework as an approach to managing health, safety, and environmental hazards. Addresses contemporary issues in risk assessment, risk evaluation, risk management, and risk communications. Course applications are particularly appropriate for students with career interests in occupational and environmental health. This is an advanced course aimed at students who have experience in biostatistics, epidemiology, toxicology, and health policy and management. Prerequisite: Signature of instructor.

HPM 294b. Methodology Issues in Health Services Research
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Kaplan. This course is designed for students intending to pursue health services research. Emphasizes the array of methods available to researchers, their disciplinary origins, underlying assumptions, and strengths and weaknesses. For each topic, readings include an overview of the method, drawn largely from research methods texts, and specific examples from the literature. Prerequisite: Signature of instructor.

HPM 296cd. Doctoral Seminar in Health Economics (KSG HCP 281, FAS EC 2910)
Seminars. One 2-hour session each week. 2.5 credits. Dr. Hsaio. Explores frontier work in the field of health economics. Focuses on learning advanced theories and economic models useful for policy analysis, and on helping students develop dissertation and/or research topics. Students enrolled for credit are expected to present original research at the end of the semester. Prerequisite: Doctoral candidates or very advanced master's students (with instructor's permission); a graduate-level microeconomics course.

HPM 300abcde. Tutorials
Time and credit to be arranged. Students may make individual arrangements to do work under the guidance of a member of the department. This work may include readings or special projects.

HPM 330e, 330f. Field Work
Time and credit to be arranged. Students are assigned to work on special projects such as group surveys, other types of field projects, or observation of, and limited participation in, the work of health agencies. Field assignments are made on an individual basis to meet the needs of each student insofar as possible. Work in the field is coordinated with courses in the department.

HPM 350. Research
Doctoral candidates may register for HPM 350 to undertake individual study and research.

Health and Social Behavior

HSB 200ab. Social and Behavioral Dimensions of Public Health
Lectures, discussions. One 1-hour session each week. 1.25 credits. Dr. Walsh and Members of the Department. Introduces important behavioral science concepts and insights useful in the design, implementation, and/or evaluation of change strategies. Participants will work with theoretical and conceptual frameworks from sociology and social psychology and will apply them critically to a range of contemporary public health problems. Prerequisite: This course is a requirement in the Dept. of Health and Social Behavior. All others need signature of instructor.

HSB 201ab. Principles for Designing Health Interventions
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Rudd, Dr. Daltroy. Focuses on the contribution of behavior to health status and includes an examination of individual, institutional and community health-related actions and decisions. Introduces program planning models to enable healthful change. Enrollment limited to 24 students. Prerequisite: Signature of instructor.

HSB 202cd. Innovative Strategies in Health Education
Seminars, lectures. One 2-hour session each week. 2.5 credits. Dr. Rudd. Focuses on psychosocial and educational theories and the design of theory-based health education strategies for change. Course structure emphasizes experiential learning, and content reflects innovative national as well as international programs. Enrollment limited to 18 students. Prerequisite: HSB 201a; signature of instructor.

HSB 204c. Health Promotion for Patients
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Rudd, Dr. Daltroy. This course will focus on theory and practice of health education in the clinical encounter: patient education, adherence to medical regimen, cognition and behavioral skills in chronic disease co-management, the role of social support, doctor-patient communication, and psychoeducational preparation for surgery. Enrollment limited to 18 students. Prerequisite: Signature of instructor.

HSB 205b. Teaching and Working with Groups
Role playing and analysis. One 3-hour session each week. 2.5 credits. Dr. Rudd. This experiential seminar on group work is based on role play and reflective analysis. Participants will develop listening skills, experiment with activities that build group cohesion and trust, and focus on group maintenance as well as task oriented roles. Role play (many drawn from training exercises) with follow-up analysis will form the basis of most of class work. Class discussion will be supported by a reading packet. Enrollment limited to 21 students. Prerequisite: Signature of instructor.

MCH-HSB 210ab. An Introduction to Personality and Cognitive Development
Lectures, discussions. One 2-hour session each week. 2.5 credits. Members of the Department of Maternal and Child Health. (Course described under Maternal and Child Health.)

HSB 211cd. Developing Mass Media Communications
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. DeJong, Mr. Schwartz. This course covers theories of communication, creation of radio advertising, research and polling, media buying, media and political strategy, public relations, and media advocacy. Students spend two weekends in a New York studio producing a health promotion commercial. Several lectures in Boston are via teleconference with the studio in New York. Emrollment limited to 15 students. Prerequisite: Signature of instructor; preference is given to students in Health and Social Behavior.

HSB 212b. Health Promotion through the Mass Media
Lectures, consultations. One 2.5-hour session each week plus one 1/2-hour consultation with student work groups. 2.5 credits. Dr. DeJong. Covers the development of public communication campaigns in the field of health promotion: assessing what the mass media can accomplish to promote health; designing educational materials that are consonant with principles of behavioral science; conducting formative research; executing an integrated mass media campaign. Enrollment limited to 20 students. Prerequisite: Signature of instructor; preference is given to students in Health and Social Behavior.

HSB 213ab. Society and Health
One 2-hour session each week. 2.5 credits. Dr. Walsh, Dr. Levine. Analyzes major social variables that affect public health: poverty, social class, gender, family, community, employment and housing, behavioral risks, and coping resources. Examines health consequences of social and economic policies, and the potential role of specific social interventions. Attends to issues of quantifying effects of social factors on health and elucidating mechanisms and processes that mediate between social factors and their health effects. Prerequisite: This course is a requirement in the Dept. of Health and Social Behavior.

HSB 214b. Behavior and Lifestyle Intervention
Seminars, discussions, experimental learning. One 3-hour session each week. 2.5 credits. Dr. Benfari. The course is based on the Adult Model of learning. Focuses on the role of the interventionist in the therapeutic alliance. Topics include self analysis, the role of motivation, problem solving styles, conflict resolution, power and influence in designing and implementing programs. Selected cognitive behavioral techniques are discussed and developed. Methods include readings, group discussions, cases, self-assessment and films.

HSB 217cd. Disaster Management
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Pierce, Dr. Leaning. Designed for physicians or public health officers who may be charged with responsibility for on-the-scene, immediate acute intervention during disasters. The focus will be on decision-making under stress, examining U.S. and international case studies within the theoretical framework of disaster planning, response, and assessment. Students will be asked to present a protocol addressing a specific disaster from the viewpoint of a public health official.

HSB 218cd. Studies in Health Promotion: Lessons Learned
One 2-hour session each week. 2.5 credits. Dr. Sorensen. Examines health promotion/education interventions in the U.S. and discusses applications in developing nations. Students work in groups to develop health promotion proposals. Applies basic social science principles. Enrollment limited to 20 students. Prerequisite: Signature of instructor.

HSB 220cd. An Introduction to High-Risk Behaviors: Epidemiology, Prevention, and Public Policy
Seminars. Two 1.5-hour sessions each week. 5 credits. Dr. Wechsler. Examines high-risk behaviors which place an individual at higher risk for developing health problems. Focuses on epidemiology, prevention, and public policy approaches to smoking, alcohol abuse, drug abuse, gambling, inactivity, lack of proper nutrition, violence, accidental unsafe driving, and unsafe sex.

HSB 222c. Alcoholism and Alcohol Abuse
Seminars. Two 1.5-hour sessions each week. 2.5 credits. Dr. Wechsler. Covers the nature and scope of alcoholism and alcohol abuse as a public health problem; patterns of use and abuse in the general population and among special groups; diagnosis and medical complications; treatment; alcohol and the courts, the workplace, and the family; alcohol problems in primary medical care; drinking and driving; social supports of drinking; prevention and public policy.

HSB 224a. Cancer Prevention
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Walsh, Dr. Colditz, Dr. Li, Dr. Sorensen. This course introduces cancer prevention and control from a broad range of disciplines contributing to this multi-disciplinary area. Epidemiology and biology of cancer, approaches to prevention through behavior change (diet, smoking cessation, etc.) and models of behavior change will be covered. Participants will gain an overview of approaches to cancer prevention through additional review of ongoing prevention studies. Prerequisites: Limited to students in the Cancer Education Program; Signature of instructor.

HSB 230cd. Social and Behavioral Research Methods
Seminars. Two 1.5-hour sessions each week. 5 credits. Dr. Gortmaker. Covers aspects of social and behavioral research methods, including research design, measurement, sampling, data collection, and data analysis. By case studies, methodological readings, and discussion, students learn the conduct and critical evaluation of experiments, surveys, measurement construction, longitudinal research, observational studies, the use of structural equation models, and grant proposal writing. Prerequisite: BIO 200ab or BIO 201ab. A multivariate statistics course is strongly recommended.

PIH-HSB 249ab. Approaches to International Tobacco Control
Lectures, seminars. One 2-hour session each week. 2.5 credits. Dr. Reich, Dr. Connolly, Dr. Walsh. (Course described under Population and International Health.)

HSB 300abcde. Tutorial Programs
Time and credit to be arranged. Arrangements may be made with individual instructors to give a reading course on topics not covered in the department's course offerings.

HSB 350. Research Training
Training in research is available for doctoral candidates through individual arrangements with the members of the department.

Maternal and Child Health

MCH 200a. Growth and Development I
Lectures, seminars, self-instructional material. Two 2-hour sessions each week. 2.5 credits. Dr. Valadian. Instruction in physical growth, development, maturation, and aging is presented in programmed, self-instructional material, and biweekly lectures. Emphasizes the growth of children in a population as an indicator of the general health and socioeconomic development of the population. Covers topics necessary for the advanced study of growth and maturation. Also provides an understanding of assets and needs which constitute a basis for health services. Prerequisite: Signature of instructor.

MCH 202c. Growth and Development II: Factors Affecting Growth and Development
Lectures, seminars. One 2-hour session each week. 1.25 credits. Dr. Dwyer. Explores definable influences that act on the course of physical growth and development from conception to maturity. Emphasizes understanding the nature of the factor and its direct effects, as well as on how factors interrelate to produce some characteristics of mature individuals. Considers implications of factors for planning and providing health services and for future research.

MCH 203f. Primary Maternal and Child Health Care
Not to be given 1992-92. Seminars, field visits. Full-day sessions. 1.25 credits. Dr. Gardner. Introduces principles of organization and administration of primary health care services for mothers and children. Presents concepts of community oriented primary care, neighborhood health centers, and quality assurance. Seminars focus on the issues and problems presented in field visits. The community programs selected are diverse, including neighborhood health centers, private practice, hospital primary care, and HMO's. Enrollment limited to 12 students. Prerequisite: Signature of instructor.

MCH 204ab. Content of Maternal and Child Health Programs
Seminars. Two 2-hour sessions each week. 5 credits. Dr. Gardner. Components of health care programs for mothers and children are discussed in the context of growth and maturational processes, historical and legislative background, and social, mental health, and educational policies. Health programs appropriate to perinatal, early and late childhood, adolescence, and youth are presented in terms of the multidisciplinary and interdisciplinary action they required to improve health status. Includes discussion of factors which shape current and future maternal and child health policies and services. Topics include infant mortality and low birthweight, maternal health and mortality, case of handicapped children with special health care needs, early identification and intervention, child abuse, injury, and AIDS.

MCH 206a. Maternal and Child Health in Developing Countries
Seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Valadian, Dr. Farrell. Identifies the core elements of MCH services in developing countries and emphasizes factors which shape MCH programs in rapidly changing social and cultural environments, particularly the interactions between health, nutrition, and poverty. Case studies are used to underscore the interaction between health, other sectors, and political factors, and to illustrate the processes of planning, financing, implementing, managing, and evaluating programs. Enrollment limited to 16 students. Prerequisite: Signature of instructor.

MCH-NUT 207ab. Nutrition in Child Growth and Development
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Dwyer. Examines principles and practical problems encountered in the nutritional aspects of child growth and development. Lectures on general principles are designed to help students base their judgments on scientific evidence. Discussions deal with a variety of nutrition case studies and simulations illustrative of problems in both developing and highly industrialized countries.

MCH 209c. Services for Children with Disabilities
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Crocker, Dr. Helm. Presents a consideration of selected modern service programs in the field of disabilities, including background, special features, and evaluation. Uses outside guests from community programs for many sessions.

MCH-HSB 210ab. An Introduction to Personality and Cognitive Development
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Earls. The basic principles of child growth and development in the cognitive and the psychosocial domains are examined in this introductory course. Special emphasis is placed on understanding the theories and research of Paiget, Freud, Erikson, and others, as well as the implications of these contributions to the planning and implementation of health and/or related social and educational services for children and youth.

MCH 211cd. Women, Health, and Development
Seminars. One 2-hour session each week. 2.5 credits. Dr. Gardner, Ms. Swenson. Addresses the major issues regarding women and their relationship to health worldwide, including the changing role of women in contemporary society. Health problems are addressed in terms of their epidemiology and the impact of technology on their detection and treatment. Issues are viewed from biological, medical, behavioral, cultural, and legal perspectives.

MCH 212b. Childhood Injuries: Epidemiological Principles and Control Strategies
Not to be given 1992-93. Seminars, lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Lieberman. Discusses methods for: the analysis of injury causes; development of counter measures; and evaluation of prevention programs. Examines the role of child and adolescent development in the occurrence of injury as well as the epidemiology of specific types of intentional and unintentional injuries. Complements material presented in HPM 247d.

MCH 213d. Obstetric Epidemiology
Lectures, seminars. One 2-hour session each week. 1.25 credits. Dr. Sachs. Tackles controversial issues in maternal health through techniques in epidemiology applied to obstetrics. Focuses on maternal mortality, obstetric and gynecologic morbidity, evaluation of obstetric health care, and populations at risk, such as pregnancies in women over 35. Examines the epidemiology of prematurity and current issues such as breast-feeding, home births, Caesarian sections, and fetal monitoring.

MCH-HPM 215cd. Planning and Evaluating Public Health Programs
Lectures. One 2-hour session each week. 2.5 credits. Dr. Gardner. Considers the organization and administration of national, state, and local public health programs. Focuses on the development of knowledge and skills in policy formulation, needs assessment, planning, implementation, and evaluation of public health programs in the U.S. Students develop a program plan.

MCH-NUT 217d. Nutritional Surveillance
Seminars, case study. One 2-hour session each week. 2.5 credits. Dr. Peterson. Theoretical and practical issues guiding the design and implementation of domestic and international nutritional surveillance systems will be covered, including purposes for data collected, indicators of nutritional status for high risk groups, methodological issues affecting the choice of indicators and interpretation of nutritional surveillance data. Students will develop competence in the application of nutritional surveillance data through case studies and the design of a nutritional surveillance system tailored to a community of the student's choosing. Prerequisite: Introductory biostatistics and epidemiology courses.

MCH 219d. Research Methods in Maternal and Child Health
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. McCormick. This course is designed to provide an overview of research methods appropriate to maternal and child health through lectures and seminars. Topics will include use of vital statistics, confidential perinatal inquiry, admission severity scores, child health status measures, and methods of ascertaining race populations. Enrollment limited to 20 students. Prerequisite: Signature of instructor.

MCH 222b. Social Services for Children, Adolescents and Families
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Deykin. Presents the crucial role of social services in maintaining and promoting the health of children and their families. Beginning with a historical overview of social services in the U.S., the course examines current political trends which structure the content and delivery of social services, drawing comparisons with those in other countries. The social and psychological determinants of the need for social services focus on events of public health relevance, including terminal illness in childhood, adoption/foster care, family violence, day care, and services for children with HIV infection.

MCH-EPI 223b. Childhood Mental Disorders: Public Health Perspectives
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Deykin. Examines the occurrence and known risk factors of selected mental disorders of childhood and adolescence, including drug abuse, depression, hyperactivity, and anorexia. Emphasizes the methodological issues of case definition, disorder classification, current diagnostic and screening instruments, and the advantages/disadvantages of available data sources. Readings include studies selected to illustrate methodological options and usefulness for public health research. Students are required to develop and present a research design on a childhood mental disorder of their choice. Enrollment limited to 14 students. The course is not given if fewer than 6 students enroll. Prerequisite: Signature of instructor.

HPM-MCH 242b. Strategies for Change in Health
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Blendon, Dr. Feldman, Guest Lecturers. (Course described under Health Policy and Management.)

MCH 300abcd. Tutorials
Time and credit to be arranged. Students at the master's level may arrange to work individually or in small groups under the guidance of a faculty member. The work may include participation in departmental research, specialized readings, field projects in a local or state health agency, or small studies to examine more in-depth topics introduced in various courses such as planning and evaluation of MCH services for children with handicapping conditions. Tutorials are offered depending on students' interests and are limited by the amount of faculty time that is available. Arrangements must be made with individual faculty members.

MCH 330. Field Study
Field study is arranged on an individual basis to meet the special needs of each student insofar as possible.

MCH 350. Research
Doctoral students are required to undertake research in maternal and child health.

Molecular and Cellular Toxicology

TOX-EH 204ab. Principles of Toxicology (HMS BCMP 713, FAS BCMP 218)
Lectures, seminars. Two 2-hour sessions each week. One 2-hour (optional) discussion session each week. 5 credits. Dr. Farr, Dr. Milton. Emphasizes mechanisms of injury and clinical consequences following exposures to environmental and occupational chemicals. Actions are examined at the molecular, cellular, organ, and organismal levels. Methods for detecting and evaluating toxic effects of environmental and industrial chemicals are discussed, as are perspectives on the scientific basis for risk estimation in humans. Prerequisite: Organic chemistry and mammalian physiology.

TOX 208ab. Seminar in Toxicology
TOX 209cd. Seminar in Toxicology
Seminars. One 1-hour session each week. 1 credit each semester. Dr. Schlegel, Members of the Department. Includes seminars, journal clubs, and discussions of topics in basic research and the current literature in toxicology. Prerequisite: Background in toxicology or related fields; signature of instructor.

TOX 210ab. Advanced Toxicology
TOX 211cd. Advanced Toxicology
Laboratory with discussions, seminars, and assigned readings as appropriate. 5 credits. Dr. Tashjian, Members of the Department. Examines experimental methods of research in toxicology. Includes individual laboratory work. Prerequisite: TOX-EH 204ab or equivalent; signature of instructor.

TOX 250cd. Molecular and Cellular Toxicology
Not to be given 1992-93; offered alternate years. Lectures, discussions. Dr. Demple, Members of the Department. Two 2-hour sessions each week. 5 credits. Examines key issues and approaches in modern toxicology, focussed on emerging research at the molecular and cellular levels. Specific topics will include genetic toxicology (DNA repair, aberrant recombination, genetic instability, effect of carcinogens on gene expression, etc.), pathology of the cell cycle, carcinogenesis (tumor promotion, molecular biology of tumor suppressors), molecular epidemiology, and risk analysis. Weekly lectures and related critical discussions of selected current research papers. Prerequisite: Signature of instructor; background courses in biochemistry, cell biology, and genetics.

TOX 300abcd. Tutorial Programs
Time and credit to be arranged. Dr. Tashjian, Members of the Department. Opportunities are provided for tutorial work in molecular, cellular, biochemical, and environmental toxicology. Prerequisite: Signature of instructor.

TOX 350. Research
Doctoral candidates may undertake laboratory research in toxicology under the direction of a faculty member. Dr. Tashjian, Dr. Call, Dr. Demple, Dr. Farr, Dr. Ofner, Dr. Samson, Dr. Schiestl, Dr. Schlegel.

Nutrition

NUT 201b. Principles of Nutrition
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Wessling-Resnick, Members of the Department. Emphasizes basic concepts of nutrition, including relationships between nutrition and problems such as cancer and heart disease.

NUT 202cd. The Science of Human Nutrition
Lectures, case studies. Two 2-hour sessions each week. 5 credits. Dr. Herera, Dr. Frei, Members of the Department. This course reviews the biochemistry of carbohydrates, fats, proteins, vitamins, and minerals in the context of human disease. Particular emphasis is given to current knowledge of the mechanisms that may explain the role of diet in the causation and/or prevention of ischemic heart disease, diabetes, obesity, hypertension, and cancer. Recommended dietary intakes of selected nutrients will be discussed in order to understand their limitations. Prerequisite: NUT 201a is strongly recommended; prior familiarity with nutrition and the health sciences is expected, as is a basic knowledge of biochemistry and human physiology.

NUT 204ab. Departmental Seminars
NUT 204cd. Departmental Seminars
Seminars. Two 1-hour sessions each week. 2.5 credits each semester. Dr. Sul, Members of the Department. Students participate in and present seminars reviewing current research and publications related

to nutrition in addition to attending advanced seminars presented by faculty and guest speakers. Beginning students learn skills required for oral presentations. Topics include both basic research and applied areas of nutrition.

MCH-NUT 207cd. Nutrition in Child Growth and Development
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Dwyer. (Course described under Maternal and Child Health.)

NUT 209ab. Food Science and Nutrition
Lectures, discussions. One 2-hour session each week. 2.5 credits. Mrs. Witschi, Dr. Samonds, Members of the Department. Deals with nutrition in terms of the foods which supply mankind's nutrient needs, their composition and physical properties, and the positive and negative effects of genetic manipulation on nutrient qualities of food, agricultural practice, processing, storage, and cooking. The historical development of food technology, including methods of preservation and sanitation, is related to current methods employed in both developing and industrialized countries.

NUT 210cd. Nutrition Problems of Less-Developed Countries
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Herrera-Acena. The nutrition problems of less-developed countries are discussed in the context of basic human needs. The ecology and the biological and behavioral consequences of malnutrition are reviewed in detail. Special emphasis is on issues in human biology relevant to the formulation of nutrition policy and programs.

NUT 214ab. Research Techniques in Nutritional Biochemistry
NUT 214cd. Research Techniques in Nutritional Biochemistry
Laboratory. Fifteen hours minimum each week. 5 credits each semester. Dr. Storch, Members of the Program in Nutritional Biochemistry. Students rotate through the laboratories (one each period) of faculty members in the Nutritional Biochemistry Program in order to learn current techniques applied to nutritional, cellular, and biochemical research. Students present oral and written reports on the research they have completed to the Nutrition faculty one rotation per quarter. Generally limited to Nutritional Biochemistry students in the Department of Nutrition.

NUT-EPI 216cd. Nutritional Epidemiology
Lectures. One 2-hour session each week. 2.5 credits. Dr. Willett, Mrs. Witschi. Reviews methods for assessing the dietary intake of populations and individuals. Students gain experience in the actual collection, analysis (including conversion to nutrients by computer), and interpretation of dietary intake. Case studies follow, involving specific diet/disease relationships integrating information from international studies, secular trends, clinical trials, analytical epidemiology, and animal experiments. Prerequisite: BIO 200ab or BIO201ab, EPI 200a or EPI 201a; signature of instructor for students who have not taken a course in nutrition.

MCH-NUT 217d. Nutritional Surveillance
Seminars, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Peterson. (Course described under Maternal and Child Health.)

NUT 300abcde. Tutorial Programs
Time and credit to be arranged. Individual work under faculty supervision may be arranged. This can include laboratory studies, projects in applied nutrition, library research, or the following special topic.

NUT 301. Nutrition and Health Promotion in the Mass Media
Dr. Willett, Dr. Cheung. The role of the mass media in the promotion and adoption of healthy eating practices; extent and quality of coverage in various mass media outlets; creating messages for mass media use; effectiveness of existing mass communication campaigns in nutrition. Prerequisite: NUT 201a/201b or equivalent; background in behavioral sciences or education.

NUT 352-374. Research
Time and credit to be arranged. Facilities are available for doctoral students to do advanced work in nutrition along the lines of fundamental or applied research as related to public health and medicine. Areas currently receiving intensive and comprehensive study in the department are as follows:

NUT 352. Dr. P. Goldman.
The metabolism of food constituents and drugs, particularly as carried out by intestinal bacteria. Emphasis given to areas of metabolism that may help to understand a compound's biological activity.

NUT 356. Dr. Antoniades.
Regulation of normal cell growth by growth factor polypeptides; molecular pathology of human proliferative disorders.

NUT 358. Dr. Herrera-Acena.
The role of nutrition and other environmental factors in the etiology and management of diabetes mellitus; the relationship of malnutrition to physical and cognitive development; Vitamin A deficiency and child morbidity and mortality.

NUT 363. Mrs. Witschi.
Computer-based interactive dietary history, analysis, and counseling programs.

NUT 364. Dr. Reinhold.
Structural characterization of glycoconjugates on biosurfaces by high performance liquid chromatography, gas chromatography, and mass spectrometry.

NUT 369. Dr. Sul.
Regulation of lipogenic and glycolytic enzymes by hormonal and nutritional factors and alteration of this regulation in the diabetic state.

NUT 370. Dr. Storch.
Regulation of lipid transport and membrane composition. Structural and functional analysis of fatty acid binding proteins.

NUT 371. Dr. Peterson.
Nutrition surveillance, epidemiology of malnutrition in industrialized and developing countries, methodological issues related to growth and nutrition status indicators, evaluation of community-based nutrition interventions. Admission limited and subject to approval of the instructor.

NUT 372. Dr. Frei
The roles of oxidants and antioxidants in the pathogenesis of atherosclerosis; assessment of oxidative stress in *in vivo*.

NUT 373. Dr. Wessling-Resnick
Regulation of the cellular uptake of macromolecular nutrients; iron transport mechanisms.

NUT 374. Dr. Willett
Nutritional epidemiology. Includes both the development and evaluation of questionnaire and biochemical methods to measure dietary intake in epidemiologic studies, and epidemiologic studies of nutritional factors in relation to risk of human diseases.

Population and International Health

PIH 191ab. Cities and Regions (Sociology 191)
Lectures. Two 1-hour sessions each week. 5 credits. Dr. Alonso. Stresses the interaction of societies and their geographies, focusing primarily on historic and current developments in the United States. Considers demography, technology, institutions, ideology, health, the economy, and other factors.

PIH 200a. Introduction to Population and International Health
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Chen, Dr. Hill. Required for all departmental students, this introductory course will review the basic dimensions of world population and health problems. The histories of the international population and public health movements are examined, and contemporary demographic and epidemiologic conditions are reviewed. Four academic areas of departmental concentration are introduced-demography, reproductive health, international health policy and management, and international health epidemiology and ecology. The objectives of the course are: to ensure that students are "literate" with regard to the major areas of interest in the Department; that they possess basic knowledge of history and contemporary situations; and that they are prepared for entry into more advanced subfields offered by the Department.

PIH 211ab. Management in Public Health in Developing Countries
Case discussions, lectures. Two 2-hour sessions each week. 5 credits. Dr. Lucas, Members of the Department. Introduces major issues and methods for understanding management in public health in developing countries. Examines key concepts of management, including organizational purpose and strategy, human resources development, organizational operations, budget and financial control systems, management information systems, and the external environment. Considers management in international agencies. Uses cases and readings appropriate to developing country context.

PIH 212c. Sociocultural Dimensions of International Health
Two 2-hour sessions per week. 2.5 credits. Dr. Heggenhougen, Dr. Weiss. Discusses the relevance of sociocultural factors and elaborates the contributions of medical anthropology, its concepts and methods, to international public health. Demonstrates a sociocultural conceptual framework analysis of health. Demonstrates how a health-seeking behavior, professional and public health education, and the challenges of specific tropical diseases may compliment epidemiological and biological models.

PIH-HPM 213d. Management Information Systems for Third World Health Systems
Lectures, discussion, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Reich, Dr. Lamstein. Explores the theoretical and practical concepts of information systems design. Begins with basic concepts of management, information theory, and systems analysis and proceeds to develop a general understanding of the design considerations of a MIS. Focuses on both public and private sector systems and on the "human side" of MIS implementation. Emphasizes MIS development for use by third-world health sector managers.

PIH 217d. Determinants of Urban Health Care
Lectures, discussions. Two 2-hour sessions per week. 2.5 credits. Dr. Cash. With the use of lectures, discussions, and case studies drawn from a number of devel-oping countries, this course seeks to examine key issues such as the population dynamics of urbanization, social organization within squatter settlements, their political economy, their need for basic services, their infrastructure requirements, and the policy implications of the continuing increase in urban squatter settlements. The study of health needs unique to these populations, the successes and failures of existing urban health systems, and recent worldwide efforts at revamping health delivery in urban areas are also considered.

HPM-PIH 218c. Human Rights for Public Health Practitioners
Two 2-hour sessions per week. 2.5 credits. Dr. Mann, Mr. Gostin, Dr. Curran, Dr. Tomasevski. (Course described under Health Policy and Management.)

PIH 220b. Introduction to Demographic Methods
Lectures, discussions and practicals. Two 2-hour sessions each week. 2.5 credits. Dr. Hill and Departmental members. Reviews the main demographic approaches to the measurement of levels, trends and differentials in fertility, mortality, migration and population growth. Topics include basic formal demography, how the age distribution of a population is determined, period and cohort fertility, mortality patterns and life tables. Model fertility and mortality schedules are explained. Applications to contemporary and historical populations are illustrated. Prepares the student for more advanced work in demography including PIH 221c and PIH 222d.

PIH 221c. Analysis of Fertility and Proximate Determinants
Seminars, discussions, practicals. Two 2-hour sessions each week. 2.5 credits. Dr. Hill and Members of the Department. Introduces models for the study of age patterns of fertility. Discusses the analysis of period and cohort trends with vital registration data and birth history material. Explores the concept of natural fertility and its biological and behavioral determinants. Explains the proximate determinants schema with examples of its application to the analysis of fertility and the estimation of the contribution of family planning programs to fertility change. Class exercises are required. Use of micro-computers is optional. Prerequisite: PIH 220b or equivalent.

PIH 222d. Analysis of Mortality and Its Main Determinants
Seminars, discussions, practicals. Two 2-hour sessions each week. 2.5 credits. Dr. Hill and Members of the Department. Explains how childhood mortality is measured when registration data are lacking. Shows how data from surveys and routinely collected health data may be used for mortality assessments. Includes a discussion of Brass techniques for childhood mortality estimation as well as life table methods from birth histories. Adult mortality is described using direct and indirect methods, including methods based on orphanhood and sibling survival, and adjusted age-specific death rates. Examines the main demographic causes of childhood and adult mortality differentials. Class exercises are required. Use of micro-computers optional. Prerequisite: PIH 220b. PIH 221c recommended.

PIH 223ab. Social Science Approaches to Population Change
Lectures. Two 2-hour sessions each week. 5 credits. Dr. Chen, Dr. Mertens, Dr. Das Gupta, Members of the Department. To familiarize students with the major theories of population change and their implications for population programs and policies. Reviews major contributions and debates in the social sciences in regard to three

major social transitions: the demographic (fertility, family and health transition), the rural urban (migration and urbanization) and the composition of labor force. Efforts are made to link elements of the various transitions within a framework which gives attention to culture, value systems, the structure of society, population systems and to general development, health and population policies. The course focuses on both historical experience and societies in the contemporary developing world. Short papers and final paper are required.

EPI-PIH 224c. Epidemiology of AIDS in Developing Countries
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Hunter. (Course described under Epidemiology.)

PIH 226b. Dynamics of Health and Fertility Change
Seminars, case studies. Two 2-hour sessions each week. 2.5 credits. Dr. Obermeyer. Uses case studies drawn from the historical experience of Western countries and from contemporary societies in Asia, Africa, Latin America, and the Middle East. The course focuses on the decline of fertility and mortality in the world. Discusses the role of socioeconomic determinants, medical and public health measures, as well as cultural factors, in explaining demographic change.

PIH 227c. Anthropological Approaches to Demographic and Health Research
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Obermeyer. This course uses the concepts and methods of anthropology to understand patterns of disease and reproduction in their cultural context. Through treading anthropological studies students will acquire a broader perspective on the cultural context of health and fertility behavior, in particular reproduction, maternal health, and child health. They will learn about anthropological methods and the tools of research that are used to complement demography and epidemiology, including participant observation, focus groups and rapid assessment procedures.

PIH 228d. The Social Demography of the Family
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Hill, Dr. Das Gupta. This course reviews the theoretical and empirical contributions to the study of the family and the household as these relate to health and demographic outcomes. It will discuss the implications for health of different patterns of household formation; power relations between the sexes and between the old and the young; and the role of the household in coping mechanisms and informal insurance systems. These will be illustrated with studies drawn largely from societies in the historical experience of the West and from contemporary developing countries.

PIH 230b. Fundamentals of Reproductive Physiology
Lectures. Two 2-hour sessions each week. 2.5 credits. Dr. Snow. This course is a comprehensive introduction to human reproductive physiology and endocrinology. Topics include: sexual differentiation and development; oogenesis and follicular growth, spermatogenesis; steroidogenesis, metabolism and excretion; the human menstrual cycle; hypothalamic-pituitary regulation; conception, implantation placental development; physiologic changes with pregnancy; parturition; lactation. The course is designed to prepare students for subsequent coursework in reproductive health conceptive technology and applied problems in Maternal and Child Health and family planning service delivery.

PIH 231c. Reproductive Health
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Snow, Dr. Aitken. This course is a review of the main reproductive health problems affecting women and men in non-industrialized countries. Topics include: the global epidemiology of reproductive morbidity and mortality; the pathophysiology of subfecundity; the complications of pregnancy and child birth; perinatal morbidity and mortality including low birth weight; reproductive tract infections and cancers; and also a review of the mechanisms of contraceptive technologies and clinical procedures for abortion. Prerequisite PIH 230b or equivalent.

PIH 232c. Case Studies in Design and Management of Family Planning/ Community Health Programs in Developing Countries
Case discussions, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Hill and Members of the Department. A managerial perspective on the problems of developing and implementing population and primary health care programs in third-world nations. Problems are examined from the level of managers of clinics and managers of community and national programs. Topics are covered primarily through case studies based on family planning and primary health care programs, particularly at the community and regional levels.

PIH 235d. Maternal and Perinatal Care in Developing Countries
Discussions, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Aitken. This course examines issues in the delivery of maternal and perinatal health care in developing countries. The approach will be epidemiological and community-oriented. The determinants and consequences of such problems as obstructed labor, hemorrhage, anaemia, and low birth weight will be examined. Possible solutions will be discussed in terms of the technologies and types of health workers available, the socio-cultural context, and the organization and management of care.

PIH 236b. Research Seminar in Reproductive Health
Seminars. One 2-hour session each week. 2.5 credits. Dr. Snow, Members of the Department. This course includes seminars and discussion of selected topics in reproductive health and the relevant current literature. Topics will change on a yearly basis. Seminars directed to second year students in reproductive health or students with prior experience in the topic currently being offered. Prerequisite: PIH 231c or signature of instructor.

PIH 237cd. Biological Basis for Fertility Control
Lectures. Three hours per week. 5 credits. Dr. Salhanick. The course is divided into essentially four parts: fundamental principles of contraception and structure-activity relationships of contraceptive and contragestational steroids; their actions, metabolism and side effects and the biological mechanisms for these actions and effects; regulation of the menstrual cycle and its application to fertility control; and, selected aspects of reproductive biology which may apply to the development of future contraceptives or contragestational agents. A short paper and/or presentation may be required. Prerequisite: Appropriate science background or signature of instructor.

PIH-HPM 240d. Political Economy of International Health Policy
Seminars, case discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Reich. Examines issues of health and development in the context of international politics and economics. Explores how relations between developed and developing countries affect the formulation and implementation of health policy and the impact of development policy on health. Students are introduced to two

contrasting perspectives on health and development: modernization theory and dependency theory, with attention to the roles of states, markets, and international institutions. Case studies are used to illustrate constraints and opportunities for influencing health and development policies.

PIH 241c. Health Planning in Developing Countries: Cost-Effective Analysis and Priority Setting Techniques
Lectures, group presentations. Two 2-hour sessions each week. 2.5 credits. Dr. Murray, Dr. Chen. Through the use of lectures, problem sets and case studies, students will learn the applied skills needed for the evaluation of health projects, interventions and programs. Emphasis will be placed on cost-effectiveness information. The class will be divided into groups which use these skills on health priority setting exercises for specific countries.

PIH 242cd. The Household Production of Health (in Developing Countries)
Lectures, discussions. One 2-hour session each week. 2.5 credits. Dr. Berman. Household economic, social, and behavioral factors are significant determinants of health status and health program performance in developing countries. This course presents a multi-disciplinary social science framework, emphasizing household economics, for analyzing household factors in health. Students will be exposed to household production, consumption and reproduction, and social relations functions and their linkages to health through micro-economic models of household behavior as applied in developing countries. Prerequisite: Basic understanding of concepts and methods of micro-economics, preferably completion of an introductory course.

PIH 245cd. Economic Development and Gender in the 1980's and 1990's
Lectures. One 2-hour session each week. 2.5 credits. Dr. Sen. This course aims to provide a review of major structural changes in the world and regional economies, and their implications for the economic situation of women in developing countries. Economic changes that have altered the context of development policy in the 1970's and particularly in the 1980's will be reviewed along with the consequent shifts in paradigms and policy approaches. In particular, the lens of gender will be used to focus on policies towards economic growth, poverty, social development and livelihoods. Prerequisite: Signature of instructor; background in development studies.

PIH 247d. Population Policies and International Development
Lectures, case discussions. One 2.5-hour session each week. 2.5 credits. Dr. Chen, Dr. Bell. This course will cover the historical and contemporary development of population policies within the context of international development focussing primarily on developing countries. The course aims to review basic population policy theory, policy instrumentalities, and qualitative analytical approaches to understanding and furthering population policy developments in diverse developmental settings. Enrollment limited to 10 students. Prerequisite: Signature of instructor.

PIH-HSB 249ab. Approaches to International Tobacco Control
Lectures, seminars. One 2-hour session each week. 2.5 credits. Dr. Reich, Dr. Connolly, Dr. Walsh. Prepares students to apply training in epidemiology, statistics, management and policy for development of comprehensive public health programs to curb tobacco use. Concepts and techniques for measuring smoking prevalence, attributable mortality, and economic costs are taught. Tobacco industry global structure, marketing, political strategies, and world expansion are discussed. Guest speakers describe health policy and program interventions including taxation, marketing restrictions, protection of nonsmokers, public education, litigation and cessation programs.

PIH-TPH 250b. Epidemiology of Infectious Diseases of Public Health Importance in Developing Countries
Lectures, team meetings. Two 2-hour sessions each week. 2.5 credits. Dr. Cash, Guest Lecturers. Thoroughly reviews the epidemiology of infectious diseases of public health importance in developing countries. Emphasizes epidemiologic patterns of bacterial and viral diseases as they relate to different geographic and socioeconomic environments. Stresses methods of disease surveillance, especially with regard to prevention and control. Case studies are extensively used with student teams proposing solutions to the problems.

PIH 253d. Human Ecology
Lectures, seminars. Two 2-hour sessions each week. 2.5 credits. Dr. Levins. Provides a broad overview of the human ecosystem as it emerges out of, but is different from, pre-human ecology. Topics are selected from biosphere processes, population interaction, agricultural systems, adaptation evolution and ecology of disease, ecological politics, and evolution. Also considers the role of knowledge and conscious planning as an aspect of human ecology and examines the approaches toward the solution of ecological problems. Prerequisite: Basic knowledge of biology.

PIH 254b. Introduction to Community Health Assessment in Developing Countries Through Community Epidemiology
Lectures, discussions. Two 2-hour sessions each week. 2.5 credits. Dr. Berggren. Illustrates and analyzes the population-based community approach to understanding the health problems of a community. Applies basic principles of epidemiology, demography, of biological, social, and behavioral ecology at the community level. Participants learn how the basic determinants of community-based measurements of risks of sickness, death, birth, and migration form the foundation for setting priorities for health programs appropriate to the community. Provides a strategy to practice community health, to document the impact of programs, and to involve the community in these processes. Reviews and analyzes classic population-based community studies in depth.

PIH-EPI 255c. AIDS: Responding to a Global Epidemic
Two 2-hour sessions each week. 2.5 credits. Dr. Mann. This course presents a global perspective on HIV/AIDS pandemic with emphasis on design and implementation of global AIDS strategy and WHO Global Program. Topics include: discovery and recognition of AIDS pandemic; development of global strategy; mobilization of opinion, resources, and institutions; national AIDS program, development assistance and international cooperation; global policy articulation; human rights. It concludes with an assessment of current status and key issues for AIDS and global health in the 1990's.

PIH 260cd. Student Project Design Seminar
Seminars. One 2-hour session each week. 5 credits. Dr. Levins, Dr. Lallemont. Oriented toward health and population problems of communities. Each student selects a community and an appropriate health or population problem. She/he presents a critical survey of the relevant literature and a project design. The objectives are to understand the selected problem in its broader context and inner structure, examine the processes of learning more about it and acting on it, and turning general insights into a workable plan. Enrollment limited to 8 students. Prerequisite: Signature of instructor; PIH 254b; introductory courses in biostatistics and epidemiology. Enrollment after interview with the instructor.

PIH 263e. Government and Private Funding for Research and Health Care
Five 3-hour sessions for one week. 1 credit. Dr. Cash, Dr. Dumbaugh. This one-week seminar was developed in response to a need of students at the Harvard School of Public Health who will be seeking funding for international or domestic research and health services programs for which they are now responsible or will be responsible upon graduation. The object of the seminar is to provide participants with: 1) the opportunity to prepare a fundable grant proposal for submission to a funding agency upon completion of the course; 2) a framework which enables participants to write realistic and fundable proposals for basic or applied research, or for projects which deliver services or care; and 3) numerous sources of information about organizations which fund such work.

PIH 264a. Ethics in Medicine and Public Health
Lectures, discussions. One 2-hour session each week. 1.25 credits. Dr. Dyck. Introduces students to major modes of moral reasoning as these are found in ethics and in health care policies. Topics include: ethical theory, the use of humans in research, medical screening, population policy, care for the dying, surrogate motherhood, and the allocation of scarce medical resources. Readings are taken from philosophical, medical, and legal scholarship, as well as official documents of governmental and non-governmental agencies.

PIH 266e or f. Field Studies
Field trip to Latin America or the Caribbean. Dr. Berggren. The objective of this one-week field study is to analyze a problem in the delivery of health services in Latin America or the Caribbean. A site and topic(s) in the Dominican Republic, Haiti, or another country in the region will be chosen after January 1, 1993. Possible topics include: community-based outreach services for endemic diseases, such as tuberculosis; combating malnutrition; or financing the operation of a district hospital. Students are divided into teams to visit the selected facilities, interview staff, clients, and responsible officials, and review available medical and financial records as needed. Each team gives an oral presentation to its hosts before departure and submits a written report following return to Boston. Students are encouraged to take PIH 254b. Students are responsible for their travel and living expenses (approximately $1,000). Enrollment limited to 10 students, with preference given to students enrolled in PIH 254b and who have relevant language skills. Prerequisite: Signature of instructor.

HPM-PIH 268cd. Paying for Health Care in Developing Countries
Two 1.5-hour sessions each week. 5 credits. Dr. Hsiao, Dr. Berman. (Course described under Health Policy and Management.)

PIH 300abcd. Tutorial Programs
Time and credit to be arranged. Students at the master's level may make arrangements for tutorial work. The program provides an opportunity to consider the design of studies, programs, or analysis of data.

PIH 350-355. Research
Time and credit to be arranged. Candidates for doctoral degrees may undertake research in the department or may integrate research in population sciences with a doctoral program in another department or at the Center for Population Studies. Members of the department and of the Center for Population Studies are currently engaged in research in the following areas:

PIH 351. Biomedicine and Reproductive Physiology
Dr. Salhanick.

PIH 353. Population Ethics
Dr. Dyck.

PIH 354. Biological Determinants of Fertility
Dr. Frisch.

PIH 355. Complex Systems
Dr. Levins.

PIH 356. Biostatistics for International Health
Dr. Wyshak.

Tropical Public Health

TPH 201a. Ecology, Epidemiology, and Control of Important Parasitic Diseases of Developing Areas
Lectures, seminars, demonstrations. Two 1-hour sessions and one 2-hour session each week. 3 credits. Dr. Maguire, Members of the Department, Guest Lecturers. Provides an introduction to ecological and epidemiologic concepts basic to the control of infectious agents. Considers important parasitic diseases of particular significance in the developing areas of the world. Epidemiologic principles of vector-associated diseases are elucidated through study of entities such as malaria and schistosomiasis. Prerequisite: Knowledge of parasitology or pathogenesis of infectious diseases desirable.

TPH 203b. Mycobacterioses
Lectures. One 2-hour session each week. 1.25 credits. Dr. Piessens, Guest Lecturers. Covers the immunobiology of mycobacteria and worldwide epidemiology, clinical diagnosis, and treatment of tuberculosis, leprosy, and diseases caused by other mycobacteria. Also deals with laboratory diagnosis, BCG vaccination, chemoprophylaxis, prevention, and tuberculosis control in Massachusetts, the U.S., and other countries. Course will not be given if fewer than 6 students enroll.

TPH 204c. Introduction to the Techniques of Investigation of Parasitic Infections
Lectures, laboratory. Two 3-hour sessions and one 2-hour session each week. 5 credits. Dr. Pan, Dr. Telford. Emphasizes basic laboratory methods for the study of parasitic diseases of public health importance. Provides exposure to theory and application of techniques essential to epidemiologic and laboratory investigation. Life cycles of several parasites are maintained and examined with respect to detection and quantification of infection, immunity, and control. Enrollment limited to 15 students. Prerequisite: Background in biology; signature of instructor.

TPH 205c. Clinical and Pathologic Features of Tropical Diseases
Case presentations, clinico-pathologic conferences, demonstrations. One 2-hour session each week. 1.25 credits. Dr. Maguire, Dr. Franz von Lichtenberg (HMS), Members of the Department, Members of the Pathology Department (HMS). Designed for students particularly interested in tropical medicine. Emphasizes the clinico-pathologic aspects of tropical diseases. At each session, disease entities are introduced by presenting a clinical case, and pertinent clinical and pathologic features of the disease are then reviewed. Prerequisite: Knowledge of pathogenesis of infectious diseases.

TPH 206d. Principles of Public Health Entomology
Lectures, laboratories, seminars, field trips. One 3-hour session each week. 2.5 credits. Dr. Spielman. The manner in which arthropods transmit disease and the principles of vector control are discussed from ecological, physiological, and genetic points of view. Class sessions introduce concepts and techniques currently employed in controlling vector-borne disease. Weekend field trips provide an opportunity for students to apply skills acquired in the classroom. Prerequisite: TPH 201a or suitable biology background.

TPH 208cd. Immunology of Parasitic Infection
To be given 1992-93; offered alternate years. Lectures, discussions. One 3-hour session each week. 5 credits. Dr. Titus, Dr. Harn, Members of the Department, Guest Lecturers. Covers aspects of immune evasion, cell-mediated and humoral aspects of protective immunity, and immunopathology in various protozoan helminth parasites of humans. Includes discussions of antigenic variation, molecular mimicry, resistance to immune mechanisms, development of protective or antipathology vaccines relevant to malaria, schistosomes, filariae, leishmania, amoeba, and trypanosomes. Each session requires reading several papers and writing answers to problem sets. Enrollment limited to 35 students. Prerequisite: Course in immunology; signature of instructor.

TPH 216cd. Cellular and Molecular Biology of Parasites
Not to be given 1992-93; offered alternate years. Lectures, discussions. One 3-hour session each week. 5 credits. Dr. Harn, Dr. Titus, Members of the Department, Guest Lecturers. Covers aspects of cell, developmental, and molecular biology of various protozoan and helminth parasites of humans. Includes discussion novel membrane structures, mechanisms by which drug development occurs, vector biology, and the molecular basis for antigenic variation and immune evasion of malaria, schistosomes, filariae, leishmania, amoeba, and trypanosomes. Each session requires reading several papers and writing answers to problem sets. Enrollment limited to 35 students. Prerequisite: Suitable course in cell/molecular biology, biochemistry, or developmental biology; signature of instructor.

PIH-TPH 250b. Epidemiology of Infectious Diseases of Public Health Importance in Developing Countries
Lectures, team meetings. Two 2-hour sessions each week. 2.5 credits. Dr. Cash, Guest Lecturers. (Course described under Population and International Health.)

TPH 300abcde. Tutorial Programs
Laboratory exercises. Time and credit to be arranged. Individual work for candidates at the master's degree level may be carried out under supervision of a member of the department. Various parasites of medical importance are maintained and are available for studies on immunology, molecular biology, cell biology, biochemistry, and chemotherapy. Arrangements are subject to the approval of the instructor.

TPH 340abcd. Seminar on the Molecular Epidemiology of Infectious Diseases
One l-hour session each week. Credits to be arranged. Dr. Maguire, Dr. Brinkmann, Dr. Wirth. Each session will consist of a presentation of an epidemiological study of an infectious disease using modern molecular biological tools. Students will be required to design projects, make oral presentations to the class, and participate in group discussions.

TPH 350. Research
Doctoral candidates or qualified full-time special students may undertake original investigations in the laboratory or in the field by arrangement with the chair of the department. Members of the department are currently engaged in the following areas of research:

Biology, host-parasite relationships, and control of protozoa and helminths

Population genetics, nutrition, and reproduction of medically-important arthropods

Immunology of protozoa and helminths

Molecular biology of protozoa and helminths

Anthropod transmission of viral, protozoan, and helminthic agents

Cultivation in vitro of parasitic helminths and protozoa of medical importance

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Nan McKenzie Laird, SB (University of Georgia), PhD (Harvard University); Henry Pickering Walcott Professor of Biostatistics.

Eric Anthony Latimer, BASc (University of Waterloo), MS (Universite de Montreal, Quebec), MS, PhD (Carnegie-Mellon University); Assistant Professor of Health Economics (Health Policy and Management).

Philip William Lavori, MS, PhD (Cornell University); Adjunct Associate Professor of Biostatistics; Associate Professor and Associate Chairman for Research, Brown University.

Tun-Hou Lee, BPH (National Taiwan University), SM, SD (Harvard University); Associate Professor of Virology (Cancer Biology).

Myrto Lefkopoulou, BA (University of Thessaloniki), MS (Rutgers University), SD (Harvard University); Assistant Professor of Biostatistics.

Sol Levine, BA (Queens College), MA, PhD (New York University); Professor of Health Behavior (Health and Social Behavior and Health Policy and Management).

Richard Levins, AB (Cornell University), PhD (Columbia University), AM (hon.)(Harvard University); John Rock Professor of Population Sciences (Population and International Health).

Richard Charles Lewontin, AB (Harvard University), AM, PhD (Columbia University); Member of the Faculty of Public Health (Population and International Health); Alexander Agassiz Professor of Zoology, Faculty of Arts and Sciences.

Frederick Pei Li, AB (New York University), MD (University of Rochester), MA (Georgetown University), AM (hon.)(Harvard University); Professor of Clinical Cancer Epidemiology (Epidemiology); Director, Division of Cancer Epidemiology, Dana-Farber Cancer Institute.

Howard Lewis Liber, SB, PhD (Massachusetts Institute of Technology); Associate Professor of Radiobiology (Cancer Biology).

John Harold Lichten, BA (Oberlin College), MSW (Boston College); Associate Dean for Finance and Member of the Faculty of Public Health.

Ellice Silver Lieberman, BA (Temple University), BHL (Gratz College), MD (University of Florida), MPH, DPH (Harvard University); Assistant Professor in the Department of Maternal and Child Health; Assistant Professor of Obstetrics, Gynecology and Reproductive Biology, Harvard Medical School.

Stuart Roger Lipsitz, BS (University of South Carolina), MS (University of North Carolina), SD (Harvard University); Assistant Professor of Biostatistics.

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Adetokunbo Oluwole Lucas, BSc, MD (University of Durham), SM (Harvard University); Professor of International Health (Population and International Health) and Director of the Education Office of the Department of Population and International Health.

Kenneth Malcolm Maclure, BA (Oxford University), SM in Epi, SD (Harvard University); Associate Professor of Epidemiology.

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Frank Erwin Speizer, AB, MD (Stanford University), AM (hon.) (Harvard University); Professor of Environmental Science (Environmental Health); Professor of Medicine, Harvard Medical School.

John Daniel Spengler, SB (University of Notre Dame), PhD (State University of New York at Albany), SM in EnvH (Harvard University); Professor of Environmental Health.

Donna Lynn Spiegelman, BA (Brandeis University), SM, SD (Harvard University); Assistant Professor of Epidemiology and Biostatistics.

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Henry Wechsler, AB (Washington and Jefferson College), AM, PhD (Harvard University); Lecturer on Social Psychology (Health and Social Behavior).

Lee-Jen Wei, BS (Fu-Jen University), PhD (University of Wisconsin), AM (hon.)(Harvard University); Professor of Biostatistics.

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Marianne Wessling-Resnick, BS (Worcester Polytechnic Institute), MS (University of Chicago), PhD (University of Massachusetts Medical School); Assistant Professor of Nutrition.

Walter Churchill Willett, MD (University of Michigan), MPH, DPH (Harvard University); Fredrick John Stare Professor of Epidemiology and Nutrition (Epidemiology and Nutrition).

Paige Leigh Williams, BS, MS, PhD (University of North Carolina); Assistant Professor of Biostatistics.

Jay Andrew Winsten, AB (University of Rochester), PhD (The Johns Hopkins University); Associate Dean for Public and Community Affairs and Member of the Faculty of Public Health.

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Paul Wise, AB, MD (Cornell University), MPH (Harvard University); Assistant Professor in the Department of Maternal and Child Health; Assistant Professor of Pediatrics, Harvard Medical School.

Jelia Cox Witschi, SB (West Virginia University), SM (Case Western University); Lecturer on Nutrition.

Martin Jay Wohl, AB (Harvard University), MD (Columbia University); Member of the Faculty of Public Health; Director of the Medical Area Health Services.

David Wypij, BS (Clarkson University), ScM (Brown University), MS, PhD (Cornell University); Assistant Professor of Biostatistics.

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Gwendolyn Emily Patricia Zahner, BA (Wellesley College), SM (Harvard University), PhD (Yale University); Assistant Professor of Epidemiology.

Marvin Zelen, SB (City College of New York), AM (University of North Carolina), PhD (American University), AM (hon.)(Harvard University); Professor of Statistical Science (Biostatistics); Member of the Faculty of Arts and Sciences; Director of Statistics Unit, Dana-Farber Cancer Institute.

Professors Emeriti

David Elliott Bell, AB, AM; LLD (hon.); Clarence James Gamble Professor of Population Sciences and International Health, Emeritus (1988).

William Alfred Burgess, SB, SM; Associate Professor of Occupational Health Engineering, Emeritus (1992).

John Cairns, MD, BA, BM, BCh, DM; AM (hon.); Professor of Microbiology, Emeritus (1992).

William John Curran, JD, LLM, SM in Hyg; LLD (hon.); Frances Glessner Lee Professor of Legal Medicine in the Faculty of Medicine and the Faculty of Public Health, Emeritus (1991).

Paul Maximillian Densen, AB, SD; AM (hon.); Professor of Community Health, Emeritus (1980).

Benjamin Greeley Ferris, Jr., AB, MD; DHC (hon.); Professor of Environmental Health and Safety, Emeritus (1989).

Melvin William First, SB, SM, SD; Professor of Environmental Health Engineering, Emeritus (1985).

Rose Epstein Frisch, AB, AM, PhD; Associate Professor of Population Studies, Emerita (1992).

Robert Pershing Geyer, SB, SM, PhD; Professor of Nutrition, Emeritus (1987).

Roy Orval Greep, SB, SM, PhD; AM, SD (hon.); John Rock Professor of Population Sciences, Emeritus (1974).

David Mark Hegsted, SB, SM, PhD; AM (hon.); Professor of Nutrition, Emeritus (1980).

Donald Frederick Hornig, SB, PhD; LLD, DHL, LLD, ScD, ScD, ScD, LLD, ScD, DEng, DSc, ScD, ScD, ScD, LLD, DSc, ScD (hon.); Professor of Chemistry in Public Health, Emeritus (1990).

George Barkley Hutchison, AB, MD, MPH; Professor of Epidemiology, Emeritus (1988).

Nathan Keyfitz, BSc, PhD; Andelot Professor of Sociology in the Faculty of Arts and Sciences and of Demography in the Faculty of Public Health, Emeritus (1983).

Alexander Hamilton Leighton, AB, AM, MD; AM (hon.); Professor of Social Psychiatry, Emeritus (1975).

Bernard Lown, SB, MD; AM, SD, SD, LHD (hon.); Professor of Cardiology in Nutrition, Emeritus (1991).

Brian MacMahon, MB, ChB, MD, DPH, PhD, SM; MD, DSc (hon.); Henry Pickering Walcott Professor of Epidemiology, Emeritus (1989).

Jere Mead, SB, MD; Cecil K. and Philip Drinker Professor of Environmental Physiology, Emeritus (1987).

C. Frederick Mosteller, SB, SM, AM, PhD; SD, SD, SD, SSD, LLD (hon.); Roger Irving Lee Professor of Mathematical Statistics, Emeritus (1987).

Steve Chia-Tung Pan, BS, MD, MPH; Professor of Tropical Public Health, Emeritus (1992).

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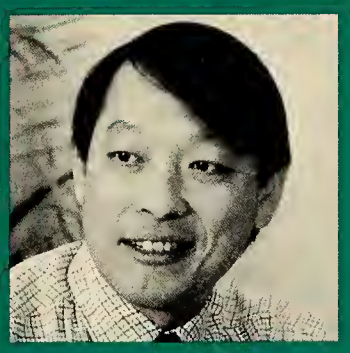

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